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JULY 1984

MAGAZINE

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Morrow MD-11
Apple IIc portable ►

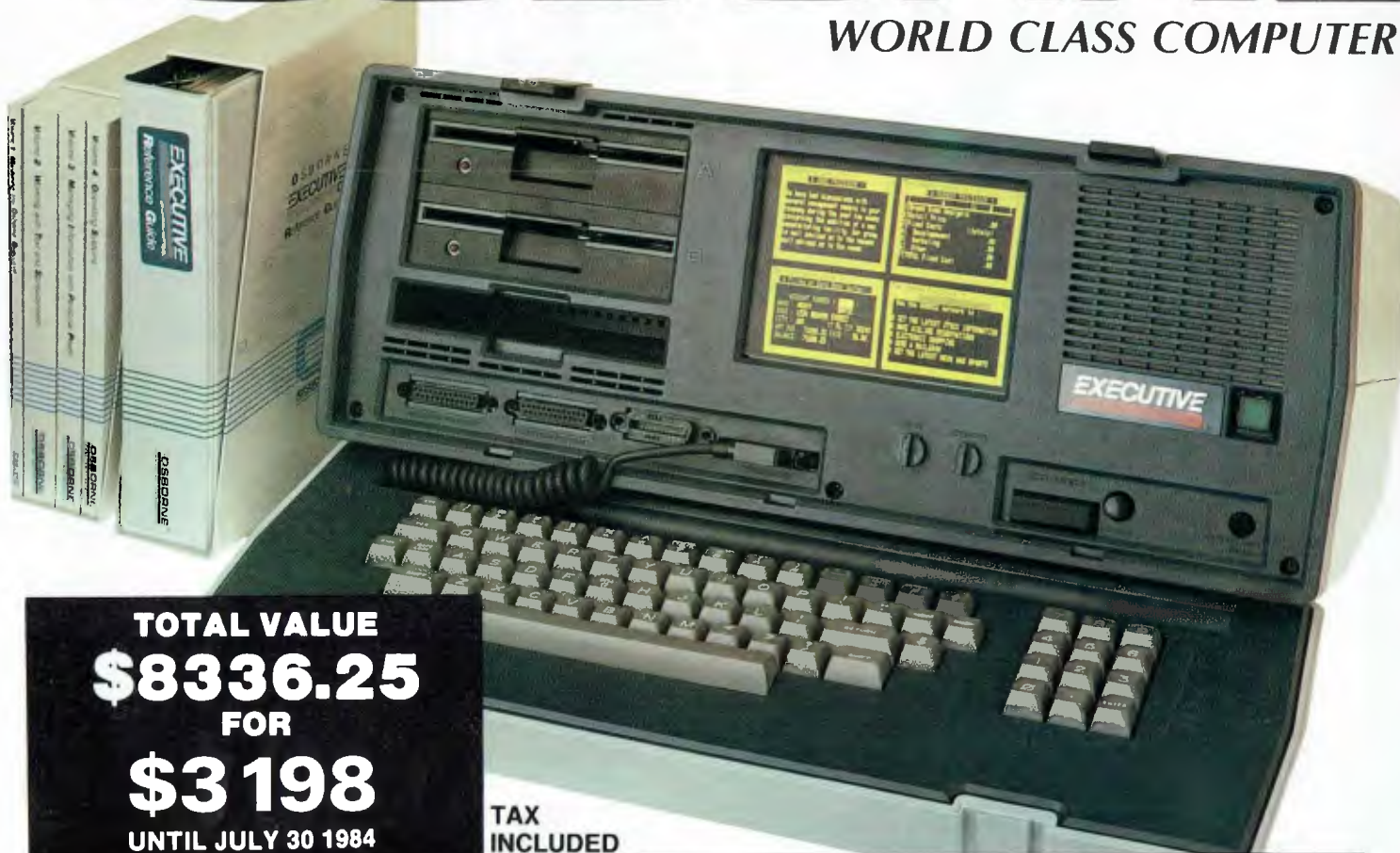
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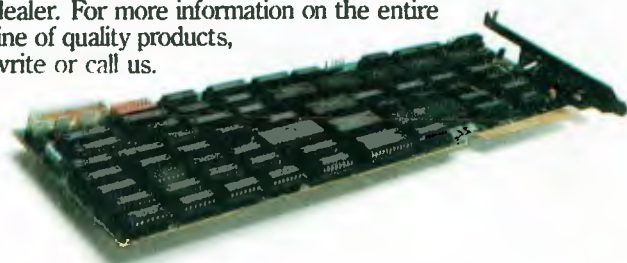
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message in comments.

YOUR COMPUTER is published
monthly by the Federal Publishing
Company Pty Ltd. Printed by ESN —
The Litho Centre, Waterloo 2017,
phone (02) 662-8888.

Editorial and NSW Advertising:
140 Joynton Avenue, Waterloo 2017.
Phone: (02) 663-9999. Postal address:
PO Box 227, Waterloo 2017.
Telex: FEDPUB AA74488.

Publisher: Michael Hannan.
Typeset by Hughes Phototype, Spit
Junction NSW. Phone: (02) 960-2788.
Distributed nationally by Gordon &
Gotch. Registered for posting as a publi-
cation — Publication No. NBP4384.
See back page for information on
copyright, contributions, reader
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*Recommended and maximum price
only. ISSN 0725-3931.

FEATURES

COMPUTERS AND MUSIC

20

Computer technology has started to revolutionise the art of making music; synthesis and digital sound sampling have opened up new worlds of expression and quality. In this special feature we introduce the concepts of computerised music, discuss synthesis and other digital techniques, and look at various software and hardware packages available for four popular microcomputers.

SIMON LEADLEY, ANDREW SYMANIZ, EVAN McHUGH,
MIKE NEWNHAM

THE GREAT AUSSIE SOFTWARE COMPETITION

48

Win a \$14,000 Labtam computer system in this all-Australian software competition — plus more exciting prizes!

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More programs — for games, utilities, home business — sent in by readers for the free use of other readers.

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77

Tim Hartnell, the Australian founder of Interface Publications, a booming computer publishing company which fosters the work of some startlingly young writers and programmers, writes to 'Your Computer' on his travels.

TIM HARTNELL

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All the features, reviews, tutorials and so on of the last year listed in index form for your convenience.

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A report on the latest computer exhibition to hit Sydney — was it bigger and better or just another ho-hum affair?

NATALIE FILATOFF

REVIEWS

APPLE'S PORTABLE BOMBSHELL

40

Apple's new portable IIc with a built-in disk drive departs from the Apple tradition by being completely sealed — it's not a hacker's paradise like the old II family! But the IIc has some pretty desirable features that will appeal to people who want to use computers rather than rebuild them.

JANE MACKENZIE

TANDY MODEL 2000

51

According to Les Bell, the Model 2000 is Tandy's best computer yet — it offers speed, performance and — unusual for a Tandy — compatibility with many commercial programs.

DBEST MACHINE FOR DJOB

56

Morrow Designs has always had a reputation for high-quality computers, but the new MD-11 surpasses even their usual standard. It just could be the best buy of the year.

LES BELL

ACCESS MANAGER/DISPLAY MANAGER

83

These two 'tools' allow you to expand the operation of your hardware and software: with Access Manager you can add indexed files and multi-user operation to programs, while Display Manager is a screen handler and terminal driver. Les Bell wouldn't work without them.

LES BELL

COMMUNICATIONS WITH AN APPLE

101

To make your Apple 'talk' to other computers you need three pieces of equipment: a modem, a serial card and a communications program. 'Terminapple' is a new communications program for the Apple that looks set to provide great service.

GEORGE BRAY

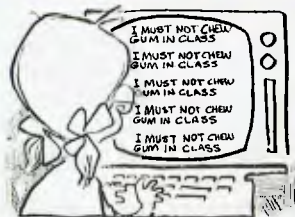
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NEXT MONTH



In our August issue we take an in-depth look at computers in education — what's happening now, what's planned for the future, what experts think should be happening — plus we review some of the educational software packages available. Also reviewed in August will be the Canon XO-7 handheld computer, Dick Smith's Cat, the Atari 800XL and the Sinclair QL — not yet released in Australia, but eagerly awaited by the many Sinclair fans in this country. All this plus our usual tutorials, news and regular columns on popular micros. Don't miss it!

SPECIALS

COMPUTERS AND MUSIC

Even the smallest home computer has some kind of built-in sound facility, and with software and hardware add-ons your computer can produce some impressive musical creations. **20**



The Australian-built Fairlight Computer Musical Instrument — state of the art in the marriage of computers and music.

POCKET PROGRAMS

More programs from readers for all kinds of popular micros and for many varied applications, ranging from games to utilities. Keep them coming!



Are Australian R&D Dead?

■ Les Bell ■

A recent international survey conducted on behalf of PA Technology, a major consulting firm, reveals some worrying attitudes on the part of Australian manufacturing managers. The survey, which was designed to investigate the attitudes of management in manufacturing companies to the adoption of new technology in processes and products, was conducted in Britain, the USA, West Germany, Belgium and Australia early this year.

EMF figures show Australia trailing the developed countries in terms of 'innovative forward orientation', one of the major contributing factors to industrial competitiveness. Overall, we rate number 12 (with a score of 52 – compare Switzerland and Japan at 70). We come well down the list when comparing gross expenditure on research and development as a percentage of gross domestic product, with 1.04 per cent of GDP going into R&D, and most of that from the government, through CSIRO.

Yet 71 per cent of Australian senior executives in the manufacturing sector believe that new technology has had either 'a great deal' or 'a fair amount' of impact on their products over the last four to five years. This was the highest percentage of any of the surveyed countries. On the other hand, 56 per cent of Australian senior executives believe that foreign competitors make the most technologically advanced products in the industries they are involved in. In all the other countries, respondents tended to believe that either their own companies, or their domestic competitors, had the most advanced products, but in Australia foreign competitors were seen to have a technological edge over the respondents' own companies by a factor of almost two to one.

This gives one pause for thought. If we're so hot on adopting new technology – more than other countries, according to the figures – then why do we think our overseas competitors have such a commanding lead? One possible thought is that what Australian executives think of as 'new technology' really isn't that at all.

Commenting on this result, Dr. Jim Fox, General Manager of PA Technology in Australia, said, "This figure indicates what a sorry position Australian manufacturing is in and contradicts industry's view of itself, in terms of research and development. From this figure it is easy to see how 15,700 jobs were lost in Australia's uncompetitive manufacturing industry over the past year."

On the other hand, fewer of our executives were satisfied with their companies' use of R&D than their overseas counterparts (62 per cent v an average of 65 per cent). Of those who were dissatisfied, 40 per cent (compared to an average of 29 per cent) said it was because of a lack of finance and investment, a significantly higher figure than in other countries. Later those who had suggested changes in their companies' areas of R&D emphasis were asked what constraints prevented them from making these changes. This time Australian executives provided the lowest response for 'lack of finance and investment' (39 per cent v an average of 54 per cent) – and the highest for 'don't know'.

What on earth is going on here? Do our companies have enough money for R&D or don't they? Or are our executives just throwing up the first excuse that comes to mind? If they do have enough money for R&D, why can't they manage it effectively?

A number of other questions spring to mind. Why is the government spending the biggest part of our R&D budget? What proportion of our R&D budget actually returns a profit over, say, a ten-year period? And who is spending that money: government or private enterprise?

Can it be that private enterprise is sticking its head in the ground in hopes of rescue by technology transferred from CSIRO?

Until we know the answers to these questions, it looks like our national technology policy and the policies of our industries are in a shambles. □

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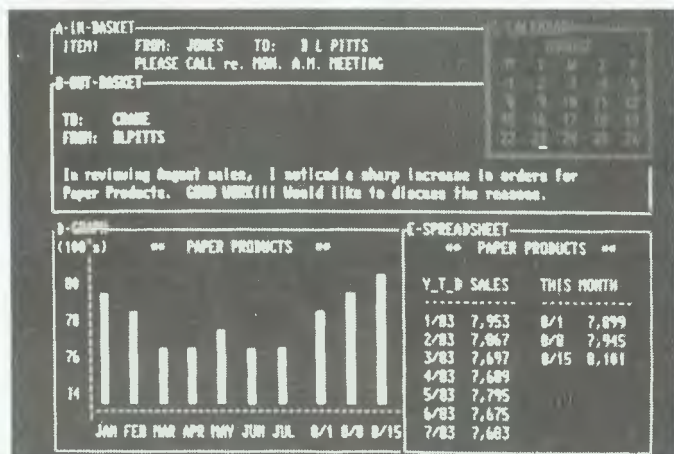


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Windowing with IBM-PC



IN response to a need for office personnel to be able to access and interrelate information from different sources, IBM has released the 3270 Personal Computer.

Directed mainly at users of large mainframes who want to retrieve information for personal computing use, the 3270 provides windows into host computers and can access multiple files.

The new machine is said to combine and extend the functions of multiple 3270 terminals, an IBM-PC and two electronic 'notepads'. You can log onto and concurrently view up to four interactive applications, including one host graphics session, from one or more computer systems.

Each application screen acts like a separate 3178 or 3279 terminal — or 'unique operating session'. In addition, you can concurrently run a PC session using the IBM-PC DOS control program. And at the same time, you can bring in two 'notepad' sessions that allow you to take personal notes on-line.

The 3270's screen management capabilities allow the user to view seven sessions simultaneously, through 'windows' that can be located anywhere on the screen. These application windows can be made bigger or smaller, or take up the entire screen for dedicated applications, as your needs dictate. You can also change the colours of the characters and of the background for each of the host and notepad application windows.

You can copy information from any active 3270 session to another 3270 session, or to one of the electronic notepads. You can copy from a PC session to a 3270 session or to a notepad, and save the copied information in a computer file for later use. And you can transfer data files — either text or programs — to or from an MVS/TSO or VM/SP host system during a PC session.

In short, with the 3270-PC you can simultaneously display, interrelate and combine multiple sets of data from one or more databases or computer systems, copy data from one source to another, and transfer information between a computer and the workstation; as well as being able to work with up to four interactive computer applications concurrently, and a Personal Computer session — without having to switch back and forth between applications.

The 3270-PC comes in three standard models, with a built-in 256K or 320K user memory (expandable to 640K), the new 35 cm, 2000-character IBM 5272 colour display or the 5151 monochrome display, a new keyboard and, optionally, the Personal Computer printer. Depending on the model, you can have one or two disk drives, or a diskette drive and a 10 Mbyte fixed drive.

Prices for the 3270-PC range from \$10,000 to \$14,000. For further information, contact IBM, 169 Kent Street, Sydney 2000. Phone (02) 234 5678.

Software now protected by Copyright Act

THE FEDERAL GOVERNMENT recently made important amendments to the Copyright Act to make it applicable to computer software, at least in the short term. Software, in any form, is now protected by Australian copyright, following a decision of the full bench of the Federal Court.

The case was on appeal by Apple Computers after Justice Beaumont's original decision which stated that Melbourne company Computer Edge was not in breach of copyright by importing Wombat computers from Taiwan with code in ROM identical to that in the Apple II, since computer software was not covered by copyright law.

The Government is now examining long-term reform of the law covering computer software which, among other things, will consider the rights of educational users, the suitability of protection by copyright, and developments in international law in this direction.

Under the latest decision, software in chips is covered by copyright, as are the source programs from which it evolved. The object codes were considered 'adaptations' under the terms of the Copyright Act 1968. In his decision, Justice Fox determined: "There is no necessity for a literary work to be of any literary quality."

"It is accepted that the term includes mathematical tables, codes, and, in general, alphanumeric works."

"In the present case, there is no doubt that a great deal of skill went into the preparation of what was written, and that what was written could be read and understood by suitably trained people."

Among the changes introduced into the Copyright Act were:

- A change in the definition of 'literary work' to specifically include a computer program.
- Protection of programs whether originally created in source or object code and whether on paper or in a computer-readable form.
- A new offence under the Act outlawing advertising for the supply of infringing material.
- A broadening of the anti-piracy provision to make clear that transmission of a program for recording is to be regarded as distribution of a copy of the program.
- A new provision in the Act to make clear that a copy of a program to be used as a back-up is allowable under the Act.

The Court also found that Computer Edge was in breach of the Trade Practices Act because it had been supplying Apple user manuals when selling Wombats.

Computer Edge has been ordered to pay Apple's costs and may also be liable for damages, but shortly after the case filed an appeal to the High Court to overturn this latest decision. The rapid filing of the appeal was necessitated by a change in the Judiciary Act, which as from May 31 abolished all appeals as of right to the High Court. From that date the High Court has to grant special leave before any appeal can proceed.

The appeal is expected to be heard by the High Court late this year.

Improved Perfect Software



YOU can't improve on perfection, you might think, but the people at Perfect Information can, because the latest version of the Perfect range of software is now available.

Version 2.0 includes a dedicated word processor, electronic spreadsheet, record management system and communications package. 'Pop-up' menus guide you through the processes for each package and all functions can be performed using single keystrokes.

Perfect software will run on an IBM PC, XT or compatible with 128 Kbytes of memory. Prices are: Perfect Writer \$450, Perfect Calc \$275, Perfect Filer \$275 and Perfect Link \$149.

For more details contact Perfect Information, 19 Oxford St, Paddington 2010. (02) 332 2177. ☐

Atari Software Contest

THE Great Atari Software Contest is on. Atari owners are invited to enter the Melbourne Atari Computer Enthusiasts' competition, with great prizes in each of three sections: education, games and utilities. Each

winner has the choice of Atari hardware or Atari or APX software to the value of \$500.

For more information contact MACE Software Contest, PO Box 133, Mulgrave North 3170. ☐

Imagineering Releases

A NEW spelling checker and a connection to Ethernet for IBM-PCs were announced for Australia by Imagineering recently.

Correctstar is from Microsoft and is billed as "the fastest, most accurate and advanced spelling corrector for microcomputers." It features a dictionary of 65,000 entries, of which 9000 commonly used words are loaded into memory to improve response. Correctstar provides verifications of typing errors and misspellings, and makes suggestions of the correct spelling.

Correctstar is available for 16-bit machines such as the IBM-PC, MS-DOS machines, the TI Professional and DEC's Rainbow. It requires 192 Kbytes of RAM and two double-sided drives. Hard disk interfaces with Wordstar are supported. The stand-alone price is \$220, with reduced rates if purchasing other word processing packages as well.

The Ether-Series includes a number of packages for IBM-

PC communications and networking. Etherlink connects the IBM-PC to Ethernet, which then opens up disk and printer sharing and electronic mail. The configuration to do so requires one PC as a network server to between two to eight users, depending on the application. The system is upgradable to include more servers as required.

EtherShare permits sharing of a hard disk, with access facilities to declare areas of the disk as public, private or shared. Etherprint shares the printer and Ethermail lets users pass messages, documents and files over the network.

Etherlink costs \$1365 before tax and the three software packages \$790 each. For more information on all these products contact Imagineering, 579 Harris Street, Ultimo 2007 or phone (02) 212 1411. In New Zealand contact Imagineering, 1-3 Arawa Street, Auckland or phone 39 6124. ☐

MD 11: HARD DISK MICRO DECISION.

The Micro Decision MD 11 is a complete desktop hard disk computer system at an affordable price. It provides all the hardware and software needed by independent businessmen and professionals who appreciate the benefits of a hard disk and demand the performance this system offers.

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- * Correct II spelling checker
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What's New? ... Pussycat

DICK Smith's new Cat is not your average moggie, as we all knew long before it was officially released in early May. It is a \$699 computer, said to be able to run around 95 percent of the software available for the Apple IIe.

The quoted \$699 includes a keyboard incorporating the computer which has a 6502A central processing unit operating at 2 MHz. The Cat also has 32K of ROM with an extended version of Microsoft BASIC.

The Cat's graphics resolution is 560 by 192, and the machine offers two text modes and three graphics modes.

In addition, the Cat includes a parallel printer interface, a built-in 80-column text facility, a joystick port for games control, an RGB output and a four-channel programmable sound generator with six-octave range.

At the Cat release, Dick Smith executives also announced the opening of the first of nearly 50 Dick Smith Electronics 'Computer Cities' planned for the near future.

Computer Cities will be located in Dick Smith Electronics stores (about ten stores have so far incorporated them) and aim to offer a wide range of different computers, peripherals and software, with expert sales advice and support to back them up.

Computer City stores also offer a computer demonstration presentation for schools. Students, teachers and parents are invited to set up appointments with the store managers, to learn about and evaluate the Dick Smith computer range.

For further information, contact your nearest Dick Smith outlet, or phone (02) 888 3200. □

Fifth-Generation Developments

DEVELOPMENT of the Japanese fifth-generation computer took another step forward with the construction of a relation database machine.

According to a spokesperson for the Japanese Institute for New Generation Computer Technology, the new machine will help researchers create the second of two main pieces of hardware in the new computer.

If developed, the fifth-generation computer would make intelligent guesses, educate itself, understand human languages

and suggest solutions for specific problems.

The fifth-generation project is a ten-year national project, begun by Japan in 1982, through its department of the Ministry of International Trade and Industry. Forty of the research project's scientists are on loan from Japan's eight major computer manufacturers. To get an idea of the scale of the project, the first three years have been funded for \$40 million. □

APPLETISERS

(Pardon the pun)

What a year it has been for the Apple range. The release of the Macintosh™ personal computer and the Apple IIc Portable computer has given Apple by far the finest range of personal computers.

City Personal Computers is Sydney's oldest Apple dealer with over 3 years experience. We are the only company offering the full Apple range in Sydney and North Sydney. A visit to one of our stores will save you all the wasted time and trouble that so many experience with lesser computer stores.

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The most innovative and exciting new computer since Lisa, but at only \$4,195 including printer and MacWrite/MacPaint software! We have all the latest software and accessories as they become available, such as Lotus 123, Microsoft Multiplan, Word, Chart and File, BASIC and Pascal, and literally **hundreds** more to come.



Apple IIc

The Apple IIc Portable must be the most versatile computer ever. Use it in business, at home, in education or whatever - and take it everywhere you go because it only weighs 3.5 kg.

With built-in disk drive, printer ports and everything else you could need, and the enormous Apple II library to use, it will leave every other portable standing!

Apple Lisa 2

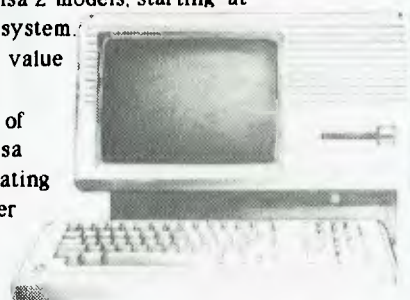
There are now three Lisa 2 models, starting at just \$4,995 for a 512K system.

That *must* be the best value on the market!

The tremendous wave of software coming for Lisa includes the Unix operating system. Only one dealer in Sydney can really claim to be a Lisa specialist and that's

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- we've supplied more than most of the other dealers put together.



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INSTANT PROGRAMMERS GUIDE.

C64/Atari/IBM This collection of programmers tools for use with the KoalaPad will teach you KoalaPad functions and Hi-Res use. Topics covered include reading raw data, plotting, scaling data, making tones as well as a section on short cuts.

COLOURING SERIES 1. C64/Apple.

Create colourful designs, choose from 26 geometric designs and use the computer to colour your pictures then match the pictures with those in the book and colour the pictures in the colouring book.

COLOURING SERIES II. C64/Apple

Colour and create patterns, experiment with shape and form, learn geometric concepts, 28 designs on disk, 56 designs to colour and compare. Re-use store and enjoy.

LOGO DESIGN MASTER. C64/Apple

Learn to use logo through drawing and pointing. Create turtle graphics with the touch of a finger, requires minimal keyboard input converts the position of your finger on the KoalaPad Touch Tablet to logo co-ordinates, increases the speed of learning logo. Draws and stores pictures and teaches problem solving. Requires Apple, M.I.T. or Commodore logo.

PAINT-A-RHYME. C64

The reusable colouring in book, over 30 nursery rhyme pictures to colour, select brush size, colour and nursery rhyme from the menu. Music plays as each picture's completed. Create and store or use the "oops" feature to erase mistakes. Promotes visual identity and tracking visual, and colour discrimination, visual motor and fine muscle co-ordination.

SPIDER EATER. C64/Apple

Turn your KoalaPad Touch Tablet into a musical keyboard. protect the treble clef from invasion of spiders. Play songs, make sounds-learn to name and recognize musical notes, develop ear, eye and hand co-ordination, develop relative pitch and internal perception. A challenge for children of all ages.

KOALA GRANS SPELLING. Apple

Unscramble letters to make words, move letters by touching the KoalaPads' surface. No keyboard input required. Builds basic language skills, letter recognition, eye-hand co-ordination, small muscle dexterity, spatial relationships and problem solving. Practice spelling rading and vocabulary. Create additional work lists.

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Rifles – The Ultimate Peripheral

RECENTLY formed microcomputer product company, Interfaceware, has released four new products for the Australian market, one of which can be used to shoot your television set.

SLR stands for Stack Light Rifle, which plugs into your computer and can be used to fire at objects on your television screen. The rifle adds extra realism to Spectrum, Atari, VIC-20 and Commodore 64 games.

The Stack Light Pen has a screen resolution of four pixels by two, giving 80 by 100 identifiable screen positions. The pen is activated by pressing on the screen in the required position. The Stack Light Pen is available

for the Commodore 64, BBC, Atari and VIC-20.

Next, the Video Pak 80 offers an integrated package with a word processor, spreadsheet and 80-column screen adaptor, in a single cartridge, for the Commodore 64.

Finally, there is a Commodore to parallel printer interface. It does the translation from Commodore character set to ASCII and still passes graphics characters. Using CMOS technology, no extra power supply is required.

For more information on any of these products contact Interfaceware, 1/303 Pacific Highway, Lindfield 2070, or phone (02) 46 4374.



Modems Overboud?

CENTRE Industries has announced two new modems for its successful Cicada 300 series. They are the Cicada 300C and 300CT (the 300CT includes a phone), designed specifically for use with the Commodore 64 and VIC-20.

Neither modem requires the use of an interface adapter or

power pack, and they can be installed easily by the end user. The modems are CCITT-V21 standard with Telecom approval.

For more information contact Centre Industries, 187 Allambie Road, Allambie Heights 2100, or phone (02) 451 5555.

Microbee Expansion

MAKE your Microbee perform amazing feats before your very eyes! According to its publicity, the Enhancer 1 does everything except cure the common cold. It plugs into the parallel port connector and features Atari, Commodore and TRS-like joystick inputs, four-voice synth, real-

time clock, speech synth option, speaker with volume control, demo program and manual. And it only costs \$139 – plus \$14 if a 1.5 amp plugpack is required.

For more information contact Vitronics, 109 Lawrence Road, Mount Waverley 3149.



Adler's No-Confusion Network

LOCAL area networking has a new player in the form of the Adler Fileserver. The Fileserver is said to interconnect 255 microcomputers and transfers data at 78,000 characters per second.

The network currently supports the Adler Alphatronic series as well as name brands like IBM and Apple. Communi-

cation is effective over a range of 1.6 kilometres and is based around an intelligent disk unit with capacity from 10 to 85 Mbytes.

For more information contact Adler Business Machines, Corner Lane Cove and Waterloo Roads, North Ryde 2113 or phone (02) 929 7299. ☐



Programming your Tartan

THE laddies from the Scottish College of Textiles have devised a new weave simulation program that allows textile designers to see exactly what a new cloth will look like without touching a loom. Six million shades can be generated, and 1000 points of detail can represent the weave of the finest

cloth. This saves the cost of designing and weaving test pieces; savings could be around 20 per cent of an annual patterning budget of \$130,000.

For more information contact the Scottish College of Textiles, Nether Road, Galashiels, Scotland. ☐

NEW LOOK COMPUTER BOOKS



**8088 ASSEMBLER
LANGUAGE
PROGRAMMING:
THE IBM PC**
Willen and Krantz

Gives you a comprehensive introduction to writing machine language software for use with the IBM PC. Functionally describes the 8088 microprocessor, furnishes detailed information about the PC's internal structure and more.

rrp \$22.50

**COMPUTHINK GUIDE
TO: SPREADSHEET
SOFTWARE**
Jesse Berst

This easy to understand, real world business tool helps you to put spreadsheet software to profitable use. Also how to find the right program at the right price.

rrp \$18.50



**COMPUTHINK GUIDE
TO: WORD
PROCESSING**
Jesse Berst

This simple, straightforward, no nonsense consumer guide provides everything you need to find the right word processor at the right price. Includes practical, shirtsleeves advice unavailable anywhere else concerning memory typewriters, small computers, dedicated processors and all other major WP options.

rrp \$18.50



**GETTING STARTED ON
YOUR MICROBEE**
Petr Lukes and
Tim Hartnell

If you have bought a Microbee, this comprehensive book will show you how to get the best out of it quickly and easily.

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For more information contact
Offcom, 28 Chandos Street, St
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438 4199. 

Burroughs Sets Itself Apart

IN the United States, Burroughs
has released a new 256K de-
sktop computer which defies
the prevalent belief that most
new products today must be
capable of running IBM soft-
ware to succeed.

The Burroughs machine of-
fers several technological en-
hancements over the IBM-PC,
including a faster microproces-
sor and smaller-sized acces-
sories. Burroughs' vice presi-
dent of dealer marketing said,

"We've never wanted IBM com-
patibility. We're looking for a dif-
ferent niche for co-existing with
IBM rather than being subser-
vient to or compatible with
them."


Not yet available in Australia,
the Burroughs machine is
priced at less than US\$4000.
This price includes the
keyboard, the toaster-sized
central computer, 256K of
memory, a video screen and
two floppy disk drives. 

Memotech Home Computers

MEMOTECH, suppliers of cards
and peripherals for Sinclair
computers, have brought out
their own home computer.

The Memotech MTX-512 of-
fers a Z80-based 64 Kbyte
machine for \$799. The machine
has BASIC built in and a Logo-
type package called MTX
Noddy in ROM. Expansion in-
cludes cassette interface, TV

and monitor output, optional
RS232 sockets and communi-
cations board. The machine
gives 16 colours and up to eight
virtual screens with 32 sprites
able to be displayed at any one
time.

For more information contact
Micromail, 4A Merrivale Road,
Pymble 2073 or phone (02)
44 1029. 

Wanted: Cyber 205 Users

ON THE eve of the commissioning of CSIRO's new super-computer, a CDC Cyber 205 Model 622, CSIRONET has put out a call to see if anyone is interested in using it. The 205 is undoubtedly a highly sophisticated number crunching monster whose price tag of \$17,000,000 is only matched by its specifications.

Any number describing this machine has more zeros after it than is easy to grasp; for example, it can easily process 400,000,000 instructions per second. Or how about this one: the machine has virtual memory with a capacity of 2 to the 48th power, or:

281,474,979,710,656 bytes (281 gigabytes), which, if you hadn't noticed, is one *very* big computer.

One interesting aspect of the computer is the use of five microprocessors to control some of the housekeeping and vital functions of the machine. Another is the seeming vacuum

that the machine has landed in. According to CSIRO, the Cyber 205 is great for scene simulation in the film and television industries; pollution monitoring and control; oil, gas and mineral exploration; VLSI design; meteorology and weather prediction; fluid dynamics; oceanography; simulation of complex manufacturing plants; development of improved engines; atomic structure of viruses; and chemical synthesis.

Great, but how many people will have the money and the applications in this country to pursue these sorts of projects? The question is a common one in the industry: "What are they going to do with it?"

At the moment it is still up in the air but, as the saying goes, it's gotta land somewhere (or on someone). In the meantime, anyone who wants a crack at writing the best Tattslotto program in Australia can contact Dr John O'Callaghan on (062) 43 3204. □

Power Spike Protection

EDOR electronics has introduced a low-cost power spike filter to the Australian market. Designed in Australia, the Computer Protector ensures good attenuation performance at frequencies up to 300 MHz. The protectors are completely sealed to ensure safety for the user and are available in 1, 3, 6 and 10 amps.

For more information contact Edor Electronics, 8 Bernhardt Avenue, Hoppers Crossing 3030, or phone (03) 749 2605. □



Disk Copying

NASHUA Discs has begun a media transfer and software duplication service in its Service Centre at Willoughby NSW. The service will provide software copying and data transfer for bona fide owners and licensees.

Program and data files can be transferred between operat-

ing systems in both 20 cm and 13 cm formats for most popular models of microcomputer in Australia. Sixty formats are currently available and copying features include full format, copy and verification to ensure reliability of each copy.

For more information contact Steve Bonner on (02) 958 2044.



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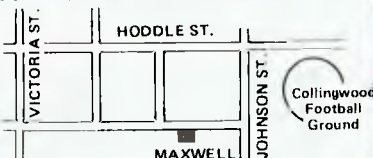
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Enhanced Commodore Operating System

BC-BASIC fills in the gaps, according to the publicity about it. It is a plug-in cartridge that provides an extra 104 BASIC keywords such as extra programming commands, programming aids, high-resolution graphics and sprite commands, and sound chip commands and functions.

There are functions to let you save any area in memory,

which means things like sprites can be saved for later use. The sound commands include controls for pitch, volume, waveform, filters, attack, decay, sustain, release, and special effects.

For more information contact Micromail, 4A Merrivale Rd, (PO Box 454), Pymble 2073, or phone (02) 44 1029. To order phone (008) 23 0200. □

FRRZBT! Goes the Video Bubble

IT looks like the pinball machine will be the only survivor in the surprising shakeout that has hit the video game industry. Quite simply, kids are getting bored with video games, and many arcade owners and game manufacturers are having to bite the energy pill.

Even laser discs, much touted as the saviour of the video industry, seem to have fallen on hard times, being re-

garded as costly and prone to failure. Nor do they represent much more than a new dog doing old tricks.

Game revenues have fallen by 35 per cent in the US and many video game makers have started discounting to arcades in an attempt to get rid of stocks. And for the kids? It looks like back to the hamburgers, pinball machines and Coke. □

Computerland goes to China

COMPUTERLAND, the world's largest chain of speciality computer stores, has announced the implementation of its plans to form a joint venture with the People's Republic of China's Ministry for the Electronics Industry, and open Computerland retail outlets throughout China.

The final form of the venture will be determined in negotiations between now and the end of the year. Said William Millard, Computerland founder and chairman, "We have been told there is no limit to the number of outlets. The joint venture will operate as a normal part of our worldwide system." Computerland already has 653 stores in 25 countries, and corporate purchasing and distribution facilities in Europe, Canada, Australia, Japan and the United States.

Said Millard, "The PRC has an intense interest in bringing its country into the age of technology. By forming a partnership with Computerland they

will have access to the best products available from every manufacturer, not only in the US, but around the world."

Computerland stores carry a selection of personal computers, software and accessories, with systems generally ranging in price from \$1000 to \$10,000. These computers are seen to be particularly appropriate to a huge country with a largely agrarian population, because they are designed for users with no technical background.

"We have already received US Government approval to ship a broad selection of our product line to Beijing for an exhibit this summer," said Millard. Soon to be submitted for US government approval is a program in which Computerland staff will train both technicians and a team of Chinese citizens, who will then train users of computers. Also being submitted for approval is the imminent sale of several thousand computer systems. □

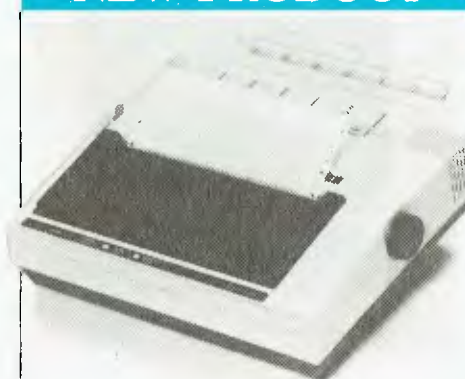
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To stay ahead you need a better computer every year

We build the Universe computer so it can be upgraded as technical improvements come along, or as your needs grow. Its totally modular design means it can be continually upgraded both in *hardware* and *software*. As new developments come along, Universe can take advantage of them first. It also means that Universe owners are never caught out with less computer than they need. Any model Universe can be upgraded to any other.

How far can a computer grow?

Most computers have very little expansion capability to meet your growing needs. Universe has almost

unlimited expansion capability. To give numbers: Memory to 6 megabytes, storage to 200 megabytes. While you may never need this sort of capacity, it does mean you are unlikely to run out of computer.

8 and 16 bit software. Can I run both?

On most computers you run one or the other. On Universe you can run both. Universe takes the whole thing further by letting you run 8 and 16 bit software together in both a single user



(CP/M 8-16) or multiuser (MP/M 8-16) installation.

Networking versus Multiuser. Avoid an Information Bottleneck

Eventually you'll probably want to have more than one person using the computer at a time. Accounts and sales or wordprocessing and data entry. Most computers get around this by offering 'Networking'; this means that several computers share the same data storage. In typical business situations this arrangement is *unworkably slow*. Universe uses an alternative and much faster Multiuser system. Each user shares part of the central computer and data with a huge increase in speed of access to data.

Multiple Program Selection. Unique to Universe but Essential to Every Business.

A fully 'computerised' office runs 6 to 8 programs or packages during a day. Most computers let you run one at a time. Our unique MPS (Multiple Program Selection) allows you to switch between any 10 CP/M 80 programs almost instantly.

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AND COMPUTERS

So you own a home computer, and with it you've battled aliens, balanced your chequebook, played a stimulating game of chess and perhaps amused yourself with the pleasures of BASIC programming. Well, what next? How about music? Simon Leadley investigates the ways in which computers may be used to produce music.

MUSICAL COMPUTING

HISTORICALLY, musical instrument manufacturers have been quick to adopt newly available technology. Music is of universal interest and is usually regarded as a leisure pastime, and perhaps it is natural that technologists should try to use new technology in an enjoyable manner as well as for purely utilitarian applications. So it is not surprising that the latest instruments draw heavily on computer technology.

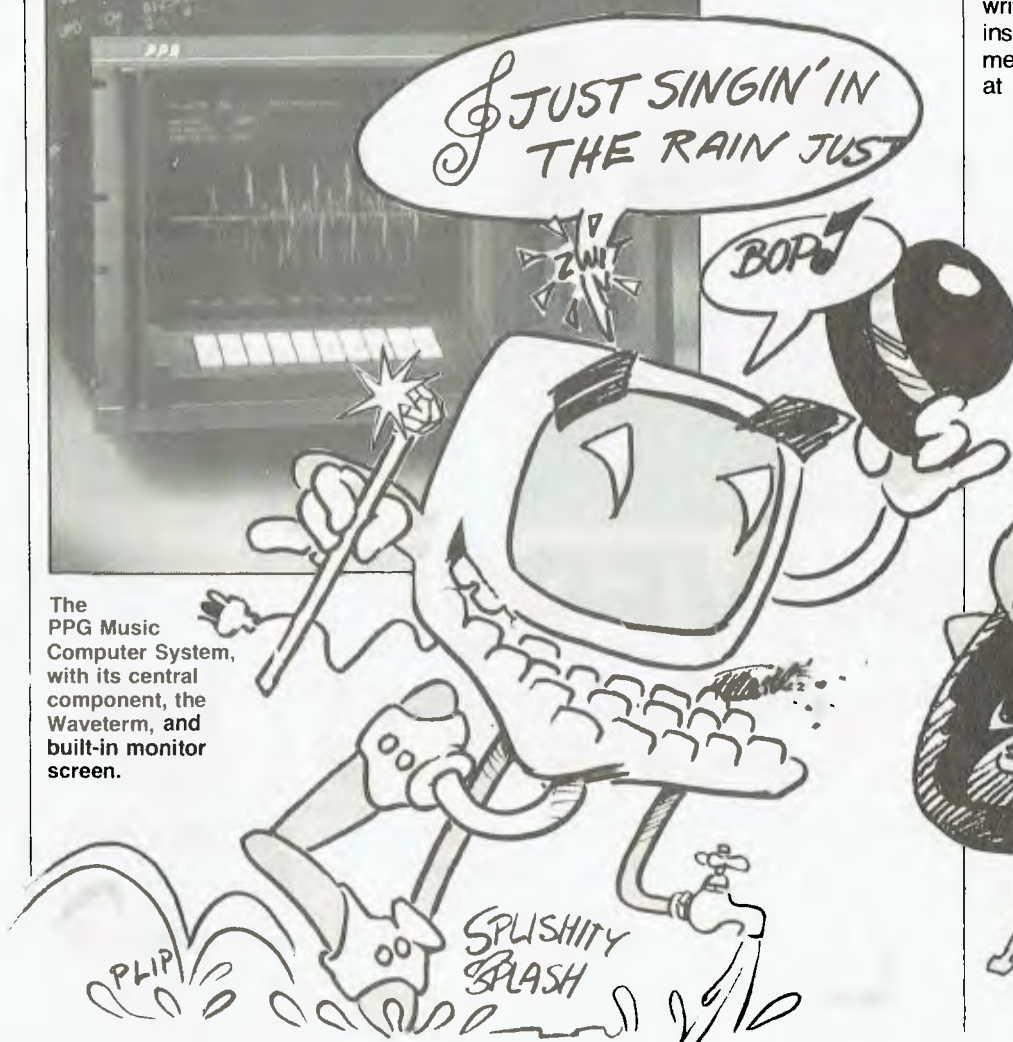
Sound Sampling

For years synthesiser manufacturers have boasted that their particular instrument could emulate the sounds of real instruments, with varying degrees of success. Not until the advent of the digital age has this dream become a reality; enter the miracle of sound sampling. So what is this mysterious concept, and how does it work?

Sound sampling basically involves looking at a voltage waveform a number of times a second, each time writing down the voltage level at that instant and storing it in computer memory as a digital number for recall at a later time. ▶



The PPG Music Computer System, with its central component, the Waveterm, and built-in monitor screen.



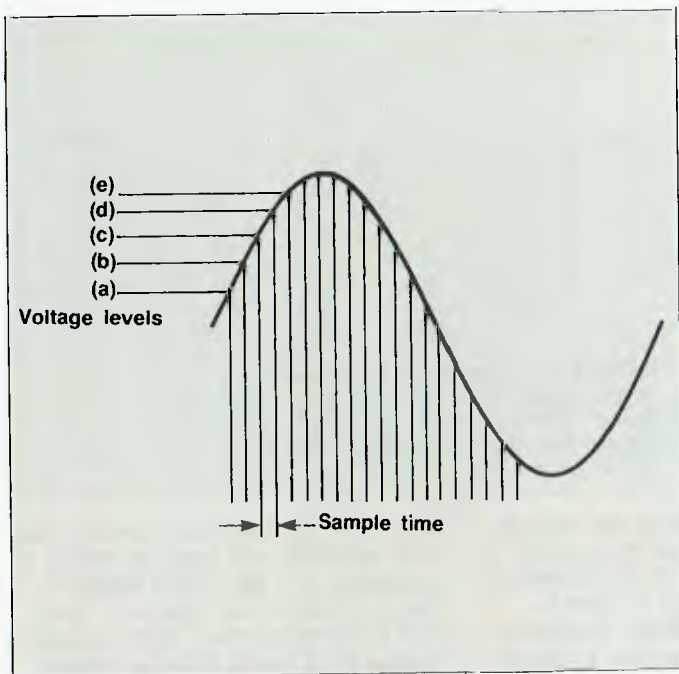


Figure 1. Sound sampling of a waveform.

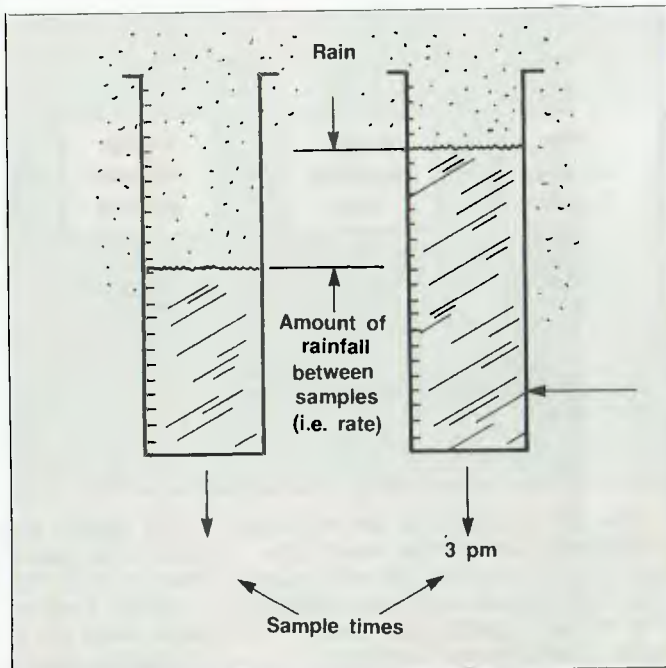
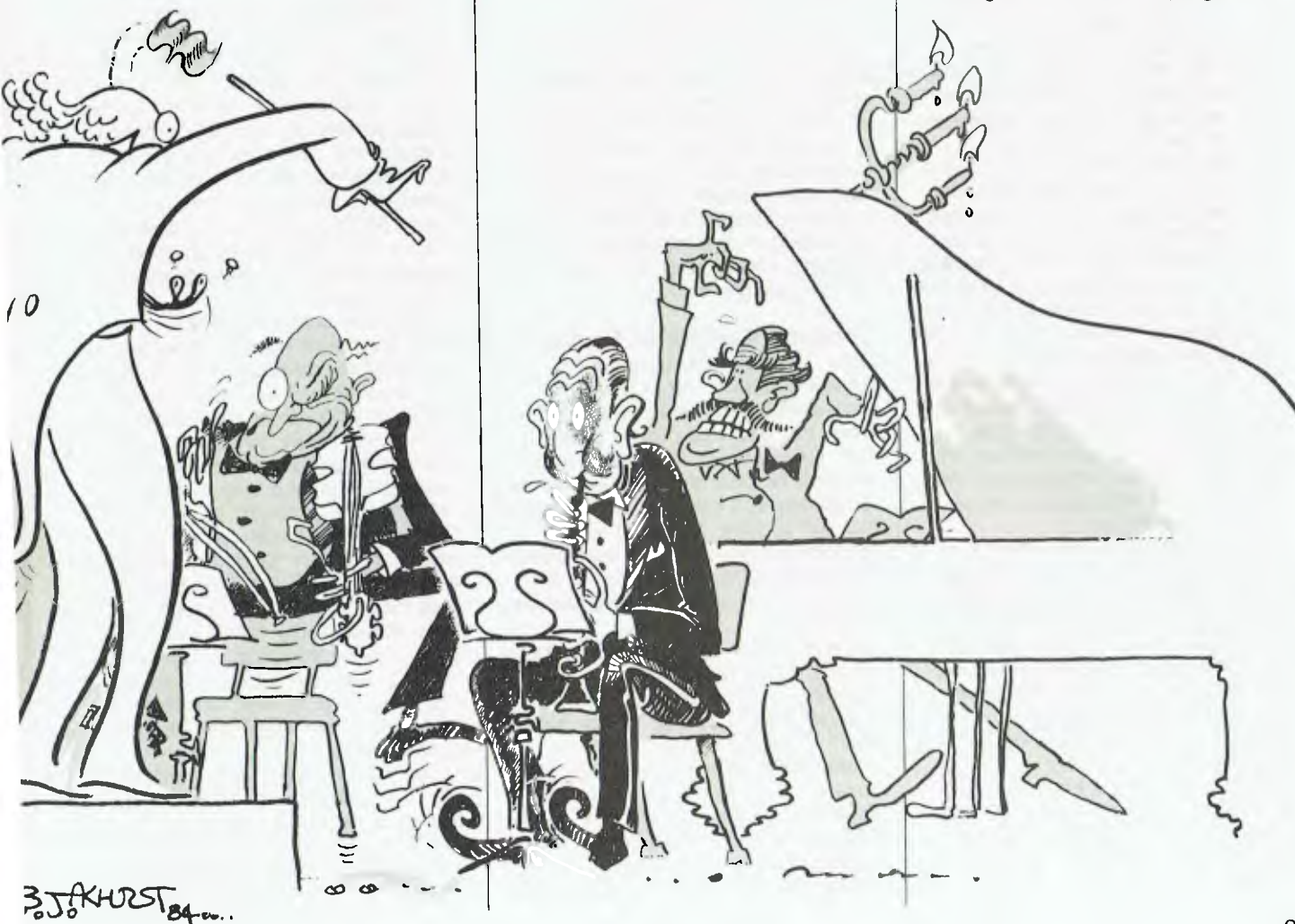


Figure 2. Measurement of rainfall between two points of time is analogous to sound sampling.



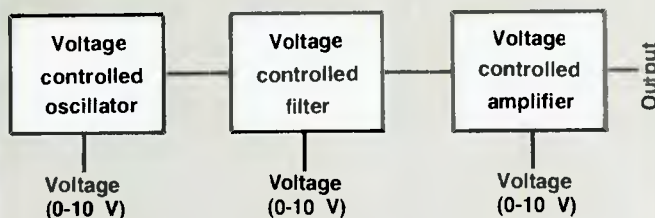


Figure 3. Diagrammatical representation of the steps inside a voltage-controlled synthesiser.

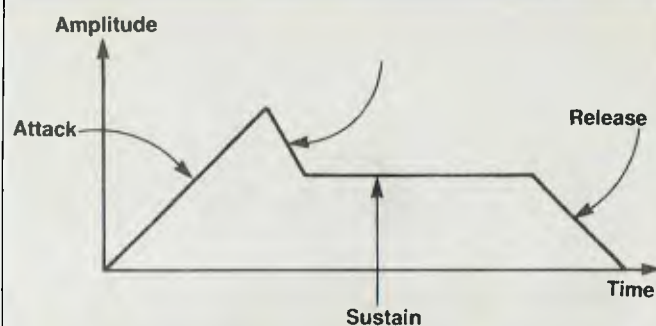


Figure 4. Diagrammatical representation of the stages which make up a complete sound, involving attack, decay, sustain, release (see box in 'Synthesis and Chips' article for a fuller explanation).

This can be likened to the way the weatherman can tell how much rain has fallen by checking the rain gauge each hour (sample rate) and comparing it to the last reading (last sample value) – see figures 1 and 2.

The advantage of sound sampling is that when done properly there is no degradation in the sound; copies of the waveform may be made again with no loss of quality. The waveform may be altered at will by merely altering the digital numbers in memory.

Modern instruments that utilise the sound sampling technique include the Emulator and the Fairlight. This sound sampling technique also forms the basis of the new generation of drum machines such as the Drumulator, the Linn Drum and the Drumtraks.

In a machine such as the Emulator, when a sound has been sampled and stored in memory, pressing a key on the keyboard will initiate the conversion process from digital to analogue, and which key is pressed determines the rate at which this process occurs and hence the frequency of the note played. In this way one note on an instrument may be sampled and then extrapolated to encompass a whole range of frequencies.

Although in a real instrument the harmonic structure of a note changes over its frequency range and hence the sound will be different, the sampled version can still be very convincing. The only way to convincingly emulate the whole instrument would be to sample each note separately, but that would require huge amounts of memory. In a typical system with a sampling rate of 30 kHz and an 8-bit format, to store one second of information requires 240 Kbits of memory, or 32 Kbytes of RAM.

The highest frequency you wish to record also determines the amount of memory used. For a 15 kHz bandwidth, a sample frequency of 30 kHz is used (twice the maximum frequency). In modern digital recording a sample rate of 44.1 kHz is used and a massive data rate of about 2.08 Mbits per second! That's a lot of RAM in anyone's language!

The main advantage of digital sound sampling is its versatility. The sound may be easily manipulated, displayed, analysed or otherwise processed by merely altering the bits in memory through a control program. An extensive use of this application has been realised in the Fairlight Computer Musical Instrument, the first generation of completely digital synthetic sound generation. But more on the Fairlight later.

Computer-Controlled Synths

Let's not forget the ubiquitous voltage-controlled synth that was pioneered by Mr Moog in a time when the equivalent to an Apple II took up a basketball stadium and required its own electricity substation to operate it. It has certainly weathered the test of time. Even the most modern voltage-controlled synthesisers, and synth chips, all operate in the same manner as the original did (see Figure 3).

Each module of the synth operates according to the voltage applied to its control. For example, the VCC will change pitch according to the control input; a change of one volt will double the frequency or, if you prefer, provide an octave pitch change. A keyboard can be used to provide this change, as each adjacent key will increase or decrease the voltage by one-twelfth of a volt, or a semi-tone

change in the oscillator. Similarly, the filter will open and close according to a voltage, and the ADSR (Attack, Decay, Sustain and Release – see box in 'Synthesis and Chips' article) curves for a sound may be defined by a voltage under the control of a VCA (voltage-controlled amplifier) – see Figure 4.

Combinations of the control voltages will result in different sounds, but it wasn't until the advent of the micro-processor that the sounds could be easily retrieved from memory. Before computer control, in order to change a sound the new parameters had to be entered via the controls on a front panel, and sometimes there were easily 50-70 parameters to change – not an easy task during a break between songs, and virtually impossible during a song.

Enter the computer. Rather than store the actual sounds as in sound sampling, the computer merely stores the value, at any one time, of the particular parameters that are on the front panel. Again, analogue-to-digital and digital-to-analogue techniques are used, but this time only to look at a voltage on a particular control, so if there are 70 controls on the panel only 70 bytes are needed to completely define the sound. So it isn't unreasonable for modern keyboards to have the capability for 50 complex sounds to be contained in non-volatile memory, with the added advantage that a cassette or disk interface may be included to extend the memory capabilities.

The state-of-the-art keyboards in this range include the Prophet T-8 and the Rhodes Chroma. The Chroma contains two on-board processors which handle parameter storage, velocity information, keying >

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The Rhodes Chroma and Apple II combinations; two keyboards to play on!

information and data transfer to and from a host computer such as an Apple II, which allows parameters to be displayed on a VDU and real-time sequencing (digital recording) with up to eight voices to be played at any one time by computer control. Rather than the computer storing any music or sounds in its memory, it merely contains the digital information that allows it to control the synthesiser at any time.

Having synthesiser architecture built around a microprocessor also means that the synths are inherently more flexible. Certain wheels and footpedals may be programmed to control different functions of any sound, so a footpedal need not only control the sustain of a sound as it normally does, but may, for example, control the opening or closing of the filter. Any software updates that are likely to improve the instrument's flexibility are merely implemented by changing the ROM chips that control the

microprocessor, so the synth is less likely to be superseded by a new one, as used to be the case, every few months.

External Sound Hardware

With the addition of outboard oscillators and filters your own home computer can become a powerful instrument in its own right. As we have seen, the computer is used merely as a controller, but one that may be reconfigured merely by changing the software that controls it.

Many add-on external sound hardware packages are available, ranging from simple sound effects units to full polyphonic synthesisers. The most popular micro at present for this type of interfacing is the Apple II. Packages like the Soundchaser from Passport Designs, which boasts a 49-note, four-octave keyboard and a 16-oscillator digital synthesiser to allow programmable frequency, amplitude and waveform modulation,

merely plug into the slots in an Apple II+ or IIe, or compatible computer. The Soundchaser retails for about \$2000, and is distributed by CompuMusic, PO Box 57, Glebe 2037. (02) 692-9875.

The Alpha Syntauri system is also based around the Apple computer and boasts a wide range of features that are found on only some of the most expensive professional synthesisers. The Alpha Syntauri is distributed by Hutchings Keyboards, 9 Edgecliff Rd, Bondi Junction 2026. (02) 387-5507.

What both these external sound hardware packages have above the pro-synth is the ability to be hooked up to printers for printing music. As well as being a great advantage for the composer, this means they can also be used in teaching music. Music courses are available on disk, and use the instrument keyboard, the computer keyboard and the hard copy from the printer as teaching aids.

What can you hope to do with the many systems that are available today? Many people criticise computer music, saying it lacks the 'feel' of real musical instruments, but anyone who has seen Gallipoli would have to admit that the music of Jean-Michelle Jarre blends perfectly with the atmosphere of the movie. Vangelis has also provided movies such as 'Bladerunner' and 'Chariots of Fire' with music that conventional methods of composition and orchestration would have failed to match.

Imagination is the key to any effective use of music, and married with computers the limits are certainly extended to a degree that has hitherto been unknown. With computers reaching further and further into our lives every day and becoming more affordable, it is inevitable that the more pleasurable sides of their use will be explored.

Besides the soundtracks mentioned, some other modern albums that borrow heavily from modern computer synthesiser technology include: 'Tears for Fears'; 'Peter Gabriel'; 'Oblivion by Utopia' (uses OB-8 synth, DSX sequencer and DMX drum (digital machine)); and 'Logic' by Logic Systems (Japan), which is all computer bar voice and guitar.

References

Musical Applications of Microprocessors, by Hal Chamberlain (Hayden).
Chroma Owners' Manual, by CBS.
Emulator Operators' Manual, by EMU Systems. □

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MUSICAL COMPUTING

From the beginning of civilisation, developments in the art of music-making have been closely influenced by the expansion of technology. Early flutes as well as swords were fashioned from metal by our ancestors, and nowadays recent advances in electronics have made our music-making machines more powerful, more controllable – and more affordable.

Synthesis and Chips

By Andrew Symaniz.

THE MUSIC-MAKER of the eighties is increasingly expanding his or her role to become a hybrid composer, musician, and conductor all rolled into one – a person who to varying degrees is also becoming a computer programmer. Not only is the hardware of the musician beginning to look distinctly more 'computerish', but some of the latest micros are starting to sound distinctly musical!

The Musical Computer/Instrument

Even the cheapest personal computers on the market have some facility for creating sound. Although limited for more serious music-making, all kinds of unusual sounds may be squeezed out of the most mute-seeming micros, such as the Sinclair ZX81, via a cheap transistor AM radio. With the radio tuned between stations you can pick up deep, mellow, low tones, high-pitched pips in rapid succession, through to sawmill or even FM-type percussive bell sounds; interesting, perhaps, but in practical terms restrictive and not easy to control.

A better solution is to attach to the computer an 'el cheapo' piece of synthesiser hardware called the 'Zon X', which has three channels for either tones or white noise. These sound channels, as well as the mixed output envelope, can be controlled with a few POKes from the infamous Sinclair keyboard.

Since the updated Sinclair Spectrum was originally conceived as a sound-producing computer it also contains an internal piezo speaker and a high-level sound command (called 'Beep') with two parameters, which are used to control the length of the sound as well as the pitch. Niftily, because the pitch parameters can either be integer or floating point numbers, the note pitches can be tuned to wildly eccentric scales (in the spirit of Harry Parth – with 43 notes to the octave) if so desired.

Computers incorporating sound chips are substantially superior to those which can only produce tones of various frequencies by switching a current on and off (which is extremely wasteful of computer time in the context of music production). Ideally, these special chips incorporate digitally controlled oscillators with built-in timers which automatically



The Fairlight Computer Musical Instrument, developed in Australia, represents the state of the art in the marriage of music and computers.

Envelopes and ADSR

Figure 1.

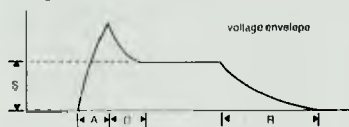
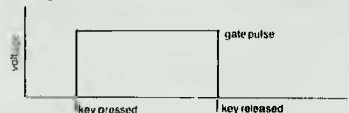


Figure 2.



Figures 1 and 2 graphically depict the concept of ADSR – attack, decay, sustain, release. 'Attack' is the initial phase of a sound; it then starts to 'decay', remains 'sustained' at a constant level for a time, and then dies away as the sound is 'released'. The steepness of the attack and the timing of the other phases of the sound contribute to different kinds of sounds: a sharp attack gives a percussive sound, while a more gradual attack curve produces a mellower sound. Computer control (or a synthesiser) allows you to vary these factors at will (within the constraints of the machine you're using, of course).

The 'envelope' is this complete sound, consisting of its ADSR variations – and thus its amplitude – over time. The function of an envelope 'shaper', therefore, is to shape the amplitude of a note. A synthesiser must have at least one envelope generator, which is fired by the trigger or gate pulse produced by the keyboard.

There are several different types of envelope generator, but the most common are the ADSR – or simply ADS – configurations described here. The ADS generator produces a rising waveshape, whose rise time depends on the attack control setting. When this reaches a maximum level, the voltage drops back to a rate dependent on the decay control, until it reaches the set sustain level, where the voltage remains until the key is released. It then dies away at the decay rate. The ADSR envelope performs in almost the same way, except the release time can be different from the decay time.

generate the required on-off signals at varying speeds under control of the computer's processor, leaving the computer free for more important tasks – for example, reading and/or processing timbre or real-time performance information.

There are several pre-programmed sound-effect commands provided for use in BASIC programs (producing noises suggested by their names – Zap, Ping, Explode, Shoot), as well

as three parameter-definable commands – 'Sound', 'Music' and 'Play'. The 'Sound' and 'Music' commands are used to select any of the three available channels, the noise frequency (or in the case of 'Music', the semitone interval in the range from C to B) and the relative volume level. The 'Play' command controls the envelope shaping characteristics and can control sounds defined by 'Sound' and 'Music'.

More Potential

A more sophisticated computer with sound potential is the BBC Micro, with its three tone channels and a white noise generator. Four parameters can be set using the BASIC keyword 'Sound': channel select, pitch of note, duration of note and a curious dual-purpose parameter that determines either the volume level or specifies one of four separate envelopes (see Figures 1 and 2 for an explanation of 'envelopes' in synthesiser terms), which can be user-defined and kept in memory for use on any or all channels in any combination.

The 'Envelope' command itself is particularly comprehensive, taking 14 different parameter values that are used to define not only separate ADSR (attack, decay, sustain, release) settings but also for defining several variations of frequency (or pitch envelope shaping) which may be required while the note is being played.

The sound chip in the BBC is the Texas Instruments SN76489, which contributes to the powerful degree of control the user has over sound shaping. However, the waveforms generated by the device (as is the case with most micro 'soundware') are still the familiar harsh-sounding squarewave tones, which always seem to remind the listener of the video arcade environment no matter how much these sounds are doctored with amplitude or frequency enveloping.

Not so, however, in the case of the 6581 Sound Interface Device (SID) manufactured by Commodore and at present used exclusively in their own personal computers such as the Commodore 64. In essence the SID is a three-oscillator 'proper' synthesiser on a chip, comprising for each voice:

- A programmable ADSR envelope generator.
- A choice of four different waveforms (triangle, sawtooth, pulse and noise).
- A master volume.
- Programmable low-pass, high-pass and band-pass filter sections.

The musical range spans eight octaves, and the 16-bit resolution of the digitally controlled sound generators, in terms of frequency, permits a resolution of 1/50 Hz per step. As such, *portamenti* and *glissandi* may be swept with inaudible stair-step approximations.

The chip makes remarkably efficient use of the Commodore 64's processing time, since it is totally digitally controlled and therefore does not require a host of D/A converters for accepting and directing various control voltages, as is the case in the usual micro-controlled synth set-up. Rather than looking up amplitude data from memory, all the envelope generation is done on-chip, which frees the micro (as well as the programmer!) for other operations.

By directly interfacing the SID chip digitally, the Commodore 64 is capable of some very impressive synthesised sounds, although, because there are no high-level music-related commands built into the ROM BASIC on the 64, the prospect of driving the chip from BASIC via POKes can be somewhat daunting to the busy musician with limited computing experience.

However, the potential is there. For example, since the duty cycle of the pulse waveform can be swept with accuracy, a very smooth pulse width modulation effect can be produced (with no audible stepping) which adds 'motion' to the sounds, as the harmonic content of the tone is dynamically shuttled between the extremes of bright, hollow squarewaves and 'nasal' pulses.

'Hard Sync' effects, characteristic of synthesisers such as the Prophet, can be obtained by synchronising the fundamental frequencies of any two oscillators together; and a wide range of complex harmonic interactions is possible by varying the frequency of one oscillator with respect to the other.

Another bit (on the same control register containing the hard sync option) sets up the possibility for ring modulation of one oscillator by another, thus generating the distinctive metallic chiming sounds this effect produces.

Furthermore, by setting yet another bit in the same register, the oscillator is reset to the start of the cycle; opening up all sorts of possibilities for generating highly complex waveforms — from synchronising the oscillator to external triggering (controlled in real time with the appropriate software), to generating complex phase or frequency modulation effects. There is even a gate-bit which can be reset to manipulate the function of the envelope generator at any point during the ADSR cycle (for triggering an early release or retriggering multiple attack cycles within the duration of a note).

Even more sophisticated modulation generator patches can be set up by feeding the control registers with the changing values found in one of the 'readable' registers. For example, the rise and fall of the third oscillator waveform or envelope, or perhaps even both, can be followed by the microprocessor and plugged back into the oscillator, filter frequency or pulse width registers of one of the other oscillators.

With a low frequency sawtooth modulator you might set up a siren-like patch, whereas a low frequency triangle can be used for controlling vibrato on another voice. 'Sample-and-hold' is even possible by using the noise waveform to modulate either the tones of another voice and/or its filter frequency. Since the low-pass and high-pass filters can be manipulated to produce band-pass or perhaps notch filter response characteristics, if used in conjunction with the 'sample-and-hold' patching, tunes could be played with each note sounding distinct in timbre from the previous one — all automatically taken care of by the computer at virtually machine code speed, and requiring no further human intervention.

Human Interface

In an attempt to quell any overexcitement from the ranks of the Musicians' Union regarding the 'inhumanity of computer music', I should point out that they may rest at peace (RAP?), for Commodore has made several provisions for external human interfaces!

Sound Seq-Editor Program for Commodore 64

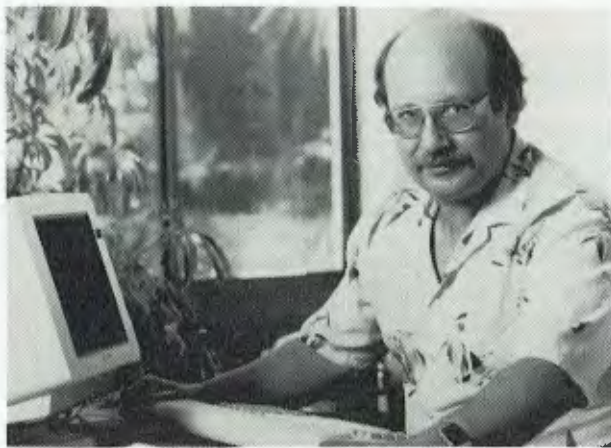
```
50 REM *** SOUND SEQ-EDITOR FOR COMMODORE-64*** AUTHOR: A SYMANIZ *****
79 REM
80 REM*** "Z" = [REVERSE ON]
81 REM
82 REM*** "Y" = [SHIFT-C]
83 REM
84 REM*** "X" = [SHIFT-V]
85 REM
86 REM*** "W" = [SHIFT-S]
87 REM
88 REM*** "U" = [SHIFT-E]
89 REM
90 REM*** "T" = [SHIFT-R]
91 REM
92 REM*** "M" = [REVERSE OFF]
93 REM
94 REM*** INITIALIZING *****
95 SUB 107:POKE53280,0:POKE53281,0:PRINTCHR$(129)
96 AD=0:SR=12:W=33:W#="S":HP=0:LP=0
100 DIM NO$(100),NO%(100),DH%(85),DL%(96)
101 GOTO2100
102 GOSUB107:PRINT"HAND ON WHILE I DO A BIT OF HOUSEKEEPING.....":PRINT
103 FORK=0TO100
104 NO$(K)="":NO%(K)=0
105 NEXT
106 GOSUB800:RETURN
107 PRINT"Q":RETURN
108 REM*** COMPOSE MODE NOTE INPUT*****
110 PRINT:PRINT:PRINT"ENTER NOTE AND <CR>"
120 PRINT:PRINT"TERMINATE SEQUENCE WITH *(CR)":PRINT
200 REM***INPUT NOTES
210 FORK=0TO89
300 PRINT"NOTE#";K+1,"#";:INPUT NO$(K)
340 IFNO$(K)="" THENGOSUB107:FORK=0TO0:PRINT:PRINT:RETURN
400 A$=NO$(K):GOSUB800
450 GOSUB1000
500 NEXTK
550 PRINT"MAXIMUM OF";K;"NOTES":RETURN
600 REM*** SCREEN VERIFYING *****
602 FORK=0TO0:PRINT:PRINT
605 PRINT:PRINT:PRINT:PRINT:PRINT
608 PRINT" "
610 FORJ=0TOK-1
700 PRINTNO$(J),CHR$(58);
800 NEXTJ
900 PRINTCHR$(157);:PRINT" ":RETURN
1000 REM*** CALCULATING NOTE NUMBER *****
1010 POKE53280,0
1015 RESTORE
1020 FORK=0TO95
1040 READH:READL:READN#
1050 IFNO$(K)=N THENNO$(K)=X:RETURN
1060 NEXTK
1082 IFNO$(K)="X" THENNO$(K)="":NO%(K)=85:K=K-1:RETURN
1083 IFNO$(K)="-" THENNO$(K)="":NO%(K)=85:K=K-1:RETURN
1084 IFNO$(K)="E" THENNO$(K)="":NO%(K)=85:K=K-1:RETURN
1085 IFNO$(K)="-" THENNO$(K)="":NO%(K)=85:K=K-1:RETURN
1090 POKE53280,7:PRINT:PRINTNO$(K):PRINTNO%(K):PRINTNO%(K)=85:K=K-1:RETURN
2050 PRINT:PRINT:PRINTK;"NOTES WERE USED":PRINT:PRINT:RETURN
2100 REM*** MAIN MENU LOOP *****
2105 PRINT:PRINT:PRINT"77777DO YOU WANT TO":PRINT
2110 PRINT"COMPOSE A SEQUENCE ?"
2130 PRINT"VERIFY SEQUENCE ?"
2150 PRINT"SAVE ONTO TAPE ?"
2200 PRINT"EDIT THE SEQUENCE ?"
2250 PRINT"READ FROM TAPE ?"
2300 PRINT:PRINTCHR$(150);"PLAY THE SEQUENCE ?"
2350 PRINT"REDEFINE SOUND ?"
2500 GETA$:IFA$="" THEN2500
2600 GOSUB 800
2600 GOTO2100
3000 REM*** WRITE TO TAPE FILE *****
3010 PRINT"FILENAME ?"
3020 INPUT F$
3100 OPENI,L,I,F$
3110 FORK=0TOK-1
3120 PRINT#I,NO$(K)
3130 NEXT
3140 CLOSEI
3200 RETURN
4000 REM*** READ FROM TAPE FILE *****
4010 PRINT"FILENAME ?"
4020 INPUT F$
4110 OPENI,L,O,F$
```

Listing continued on page 30.

With this program it is possible to compose short sequences of notes (up to 100 notes in length) and play them back while still composing. You can go back and edit any of the notes at any time, and if you want to save the sequence on tape you can do so, giving it a unique filename. If you read back the sequence at some later time, you can re-edit the notes as desired and even add extra notes, providing

you do not exceed the 100 note limit. You may also re-define the default parameters at any point, either while composing or following editing or reading from tape. In this way you can test the partly finished sequence using different sounds. If you lose track of what your sequence of notes looks like, you can verify the note memory on screen at any stage.

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UNIVERSE SUPERCOMPUTER

Continued from page 28

```

4120 C=0
4130 INPUT N1,N2,C: C=C+1
4140 IFST=0GOTO4130
4150 CLOSE1
4204 PRINT:PRINT:PRINT
4205 PRINT"HANG ON A MINUTE."
4206 PRINT"I NEED SOME TIME TO MEDITATE"
4207 PRINT:PRINT:PRINT
4208 PRINT"THE SEQUENCE ON TAPE IS:"PRINT
4209 REM*** RECONSTRUCT NOTE NAMES
4210 FORK=0TOC-1
4220 RESTORE
4230 FORK=0TOC-1
4240 READH:READL:READN#
4250 NEXTK
4300 NOK(K)=N#
4320 I#KTK
4330 RETURN
5000 REM*** FILL HI & LOW FREQ REGISTERS *****
5002 REM*** DH% = HI FREQ DATA
5010 REM*** OL% = LOW FREQ DATA
5015 X=0
5020 RESTORE
5030 READH:READL:READN#
5035 IFH=-1THENRETURN
5040 DH%(X)=H:OL%(X)=L
5050 X=X+1:GOTO5030
5200 REM*** CHANGE SOUND-PARAMETER SETTINGS *****
5205 POKES3280,14:POKES3281,13
5210 PRINT:PRINT:PRINT:PRINT
5220 PRINTTAB(0);"ATTACK/DECAY":TAB(30);AD
5230 PRINTTAB(0);"SUSTAIN/RELEASE":TAB(30);SR
5240 PRINTTAB(0);"WAVEFORM":TAB(31);W#
5250 PRINTTAB(0);"HIGH PULSE-WIDTH":TAB(30);HP
5260 PRINTTAB(0);"LOW PULSE-WIDTH":TAB(30);LP
5265 PRINT:PRINT:PRINT
5270 PRINT:INPUT" REDEFINE ATTACK/DECAY (0-255)";AD
5275 IFAD<0 OR AD>255 THEN GOSUB5380:GOTO 5270
5280 PRINT:INPUT" REDEFINE SUSTAIN/RELEASE (0-255)";SR
5285 IFSR<0 OR SR>255 THEN GOSUB5380:GOTO 5280
5290 PRINT:INPUT" REDEFINE WAVEFORM (T,S,P,H)";W#
5300 IFW#="T" THEN W=17:GOTO 5370
5310 IFW#="S" THEN W=33:GOTO 5370
5320 IFW#="P" THEN W=63:GOTO 5350
5330 IFW#="H" THEN W=129:GOTO 5370
5340 GOTO 5290
5350 PRINT:INPUT" REDEFINE HIGH PULSE-WIDTH (0-15)";HP
5355 IFHP<0 OR HP>15 THEN GOSUB5380:GOTO 5350
5360 PRINT:INPUT" REDEFINE LOW PULSE-WIDTH (0-255)";LP
5365 IFLP<0 OR LP>255 THEN GOSUB5380:GOTO 5360
5370 POKES3280,0:POKES3281,0:RETURN
5380 PRINTTAB(0);"*****OUT OF RANGE*****":RETURN
5400 REM*** PLAY OSCILLATOR ONE *****
5405 POKES4296,15:POKES3280,6:POKES3281,13:GOSUB107:GOSUB600
5410 FORX=0TO59
5420 Y=NOK(X):IFY=0THENGOTO5470
5430 POKES4276,0:POKES4277,AD:POKES4278,SR:POKES4275,HP:POKES4274,LP
5440 POKES4276,W:POKES4273,DH%(X):POKES4272,OL%(X)
5450 FORT=1TO50:NEXTT
5460 NEXTX
5470 POKES4296,0:POKES3280,0:POKES3281,0:RETURN
5600 REM*** EDIT NOTES *****
5605 POKES3280,0:POKES3281,15
5610 GOSUB107:GOSUB600
5615 PRINT"EDIT WHICH NOTE?"
5620 INPUT E1
5625 IF E1<0THEN GOSUB107:PRINT"EXIT EDITING MODE":GOSUB600:GOTO5810
5626 IFE1>K AND E1<100THEN GOSUB5800:K=E1+1:GOSUB1000:GOTO5610
5630 PRINT"AND CHANGE IT TO:"
5640 INPUT E2#
5650 NOK(E1-1)=E2#K1#K
5660 Y=E1-1
5670 GOSUB1000:K#K1
5700 GOTO5610
5900 Z=K:FORZ=KTOE1:NOK(Z)=Z:POKES3281,13:GOSUB1000:NEXTZ:GOTO5810
5910 POKES3280,0:POKES3281,0:RETURN
1000 REM*** DATA : HI FREQ , LOW FREQ , NOTE NAME *****
7100 DATA 1,18,C-4,1,35,CW-4,1,52,0-4, 1,70,DM-4,1,90,E-4,1,110,F-4
7150 DATA 1,132,FW-4,1,155,G-4,1,179,GN-4,, 1,205,A-4,1,233,AM-4,2,6,B-4
7200 DATA 2,37,C-3,2,69,CW-3,2,104,D-3, 2,140,DM-3,2,179,E-3,2,220,F-3
7250 DATA 3,8,FW-3,3,54,G-3,3,103,GN-3, 3,155,A-3,3,210,AM-3,4,12,B-3
7300 DATA 4,73,C-2,4,139,CW-2,4,208,0-2, 5,25,DM-2,5,103,E-2,5,185,F-2
7350 DATA 6,16,FW-2,6,108,G-2,6,206,GN-2, 7,53,A-2,7,163,AM-2,8,23,B-2
7400 DATA 8,147,C-, 9,21,CW-,9,159,D-, 10,60,DM-,10,205,E-,11,114,F-
7450 DATA12,32,FW-,12,216,G-,13,156,GN-, 14,107,A-,15,70,AM-
7500 DATA16,47,B-, 17,37,CW-,18,42,CW-, 19,63,D-,20,100,DM-
7550 DATA21,154,E-,22,227,F-,24,63,FW-, 25,177,G-,27,56,GN-,28,214,A
7600 DATA30,141,AM-,32,94,B-,34,75,C-, 36,85,CW-,38,126,D-
7650 DATA40,200,DM-,43,52,E-,45,190,F-, 48,127,FW-,51,97,G-
7700 DATA54,111,GN-,57,172,A-,61,126,AM-, 64,188,B-,68,149,C-
7750 DATA72,169,CW-,76,252,D-2, 81,161,DM-2, 86,105,E-,91,140,F-2
7800 DATA96,254,FW-2,102,194,G-2, 100,223,GN-2,115,88,A-2
7850 DATA122,52,AM-2,129,120,B-2,137,43, C-,145,83,CW-,153,247,0-3
7900 DATA163,31,DM-3,172,210,E-3, 183,25,F-3,193,252,FW-3
7950 DATA205,133,G-3,217,189,GN-3, 230,176,A-3,244,103,AM-3, 0,0,REST
7960 DATA -1,1
8000 REM*** COMMAND INSTRUCTIONS *****
8010 IFAS="C" THEN GOSUB107:GOSUB102:GOSUB110:GOSUB600:GOSUB2050:RETURN
8020 IFAS="X" THEN GOSUB107:GOSUB600:RETURN
8030 IFAS="O" THEN GOSUB107:GOSUB3000:RETURN
8040 IFAS="T" THEN GOSUB107:GOSUB5600:RETURN
8050 IFAS="L" THEN GOSUB107:GOSUB102:GOSUB4000:GOSUB600:RETURN
8060 IFAS="E" THEN GOSUB5400:GOSUB107:GOSUB600:RETURN
8070 IFAS="H" THEN GOSUB107:GOSUB5200:GOSUB107:GOSUB600:RETURN
8080 RETURN

```

recognises are the familiar C, D, E, F, G, and so on notation, including sharps (C#, D#, F#, G#, A#). 'C' denotes middle-C and the octave above C to B is denoted by a '+' immediately following the note name or sharp sign (shift-3), if any. Similarly, the octave below C to B is denoted by a '-' immediately following the note name. Other octaves are denoted by adding '2', '3', or '4' following the '-', or a '2' or '3' following the '+'. The total range of notes spans almost eight octaves, starting with the lowest note, "C-4", and finishing with the highest, "A#+3". If a string of symbols is keyed in which the program does not recognise, the border colour, which is black for both composing and editing modes, will flash to yellow to alert your attention.

After running the program (of course taking the precaution of saving the listing beforehand — it's amazing how fast a runaway POKE can turn an hour's work into garbage!), you will be presented with the main menu which asks you what you want to do. A sensible option at this point would be to compose a sequence (Shift-C). You are then instructed to enter the notes one at a time, each followed by carriage return.

When you feel you have entered a sufficient number of test notes you can terminate the sequence with an asterisk, which will put you back to the main menu with a message informing you how many notes you have used. You can now directly skip to the other pages such as editing (shift-E), redefining the sound parameters (up-arrow) or playing (pound sign). You can still play, edit, redefine or verify on-screen from the composing mode, but you will need to confirm your entry with a carriage return.

If you have already terminated the sequence with an asterisk or perhaps have decided to edit a sequence stored on tape, you can add extra notes by calling up the editing mode and entering a note number higher than the number of notes already in memory. The program will acknowledge your intention with a 'wink' on the screen, and proceed to provide space up to the note number you have entered. However, you will need to fill in all those extra spaces before the yellow border disappears. To exit from editing mode just enter zero for note number and carriage return.

N.B. It is not possible to play or redefine sound parameters (or do anything else, other than editing) whilst in editing mode.

If you have trouble typing in this program, send me a self-addressed padded postbag with cassette and small donation covering postage, and I will be happy to record the program and send it to you.

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The CMU-800 Compumusic console from Roland, which hooks up to an Apple II or IIe.

Two of the terminals on SID are able to read (via an A/D converter) the composer's manual intentions from the movements monitored on a couple of joysticks plugged into the control ports on the side of the computer. These can be used in performance for control of various elements (say, filtering in the X direction, and modulation in the Y direction). Furthermore, there is even provision for an external analogue input which can take sources such as voice, guitar or even the 'daisy-chained' outputs from other computers and mix them with the audio output, or process the lot through the programmable filter, which opens up a few possibilities for speech synthesis.

The Computerised Music-Instrument

If all the computer jargon about 'POKES' and control registers is not really for you, there is another side to the computer musician's coin, but you do need to be prepared to part with quite a bit of money at present for the luxury of convenience.

For the non-technical musician

there are several systems already available which use computer power to control analogue sound production, and even some that enable the computer to produce sound digitally using computer-generated waveforms - in a fashion similar to the cream of all computer music instruments, Australia's own Fairlight CMI. These bolt-on computer packages can further be subdivided into those that need to be programmed to play music (using a special music composer's language) or those that offer real-time playing capability.

Because the Apple computer offers both quality and flexibility (with its host of expansion slots on its motherboard), an Apple II of some kind is often the first choice for synthesiser manufacturers in search of an intelligent micro controller for driving their hardware.

For example, there is the Amdek Compumusic console from Roland, which when hooked up to an Apple II or IIe can be used for non-real-time eight-note polyphonic compositions, with each of the eight channels sequenced individually. Although the

system has its own limited sound-generation capability (which can be used to listen to compositions created and edited on the Apple keyboard and tabulated on the monitor in a variety of formats), the unique strength of the system lies in its ability to harness the Apple's micro-computing power to control any 'one volt per octave' synthesiser on the market via the gate and control voltage outputs on the rear panel.

In the hands of a competent working musician this powerful composer's tool operates very similarly to a word processor (in this case perhaps a music processor), since compositions may be tried out and tested before hooking up to all the latest in expensive studio synths at studio-time rates!

For those musicians interested in experimenting with digital synthesis techniques, there are several systems available which use the Mountain Computer hardware card for the Apple in conjunction with their own performance keyboards (see John Donnan's 'Introduction to Digital Synthesis', *Your Computer Yearbook* 1984).

The future for synthesiser music in the recording studio looks particularly rosy at present, with the adoption of a common protocol by the major musical electronics manufacturers for communicating with each others' products as well as with personal computers.

The so-called MIDI (Musical Instrument Digital Interface) will allow entire recording and performing systems to be combined into one programmable whole. Via the home computer the composer will take on the role of 'conductor' of a personal synthesiser orchestra, and ultimately in the studio he or she will be able to create multi-track master recording directly into the multi without even requiring the studio console, with entire sequences programmed onto floppy disk.

But most importantly of all, MIDI will change the way musicians and composers think creatively. With a whole generation of musical minds raised on the seemingly unlimited possibilities of MIDI composition techniques, surely the range of both musical expression and creativity will keep on expanding in tune with the advance of technology. There could also be the added bonus of linking musical synthesis to video synthesis via the MIDI ... anything is possible! □

Universe Supercomputer

Starts small, thinks big



We build the Universe Supercomputer for both large and small businesses. Using a totally modular design approach we build the computer right for your needs *this* year. Yet able to grow for *next* year. While costing little more than many personal computers, the Universe has reliability, speed of operation and expansion potential these machines cannot offer. Here are just some of the ways Universe is better:

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3. Flexible storage capacity. Most personal computers use limited

capacity (and lower reliability) 'mini-floppy' disks. The Universe uses high reliability industry standard 8 inch floppy disks and optional Winchester hard disks. As a result access to data is very much faster. Universe's high speed disk I/O processor further enhances the data processing speed.

4. Single or Multiuser. While many businesses manage with personal computers for a while, they eventually run into trouble when more than one person needs to use the computer at one time. A few PCs offer 'Networking' - several computers share data storage, usually on a common hard disk. This arrangement is *unworkably slow* in most business applications. Universe offers the much faster Multiuser system where several users share the main computer.

5. Unique Multitasking capability. Most computers only let you do one thing at a time. Universe's MPS (multiple program selection) facility lets you swap between up to 10 programs and sets of data almost instantly.

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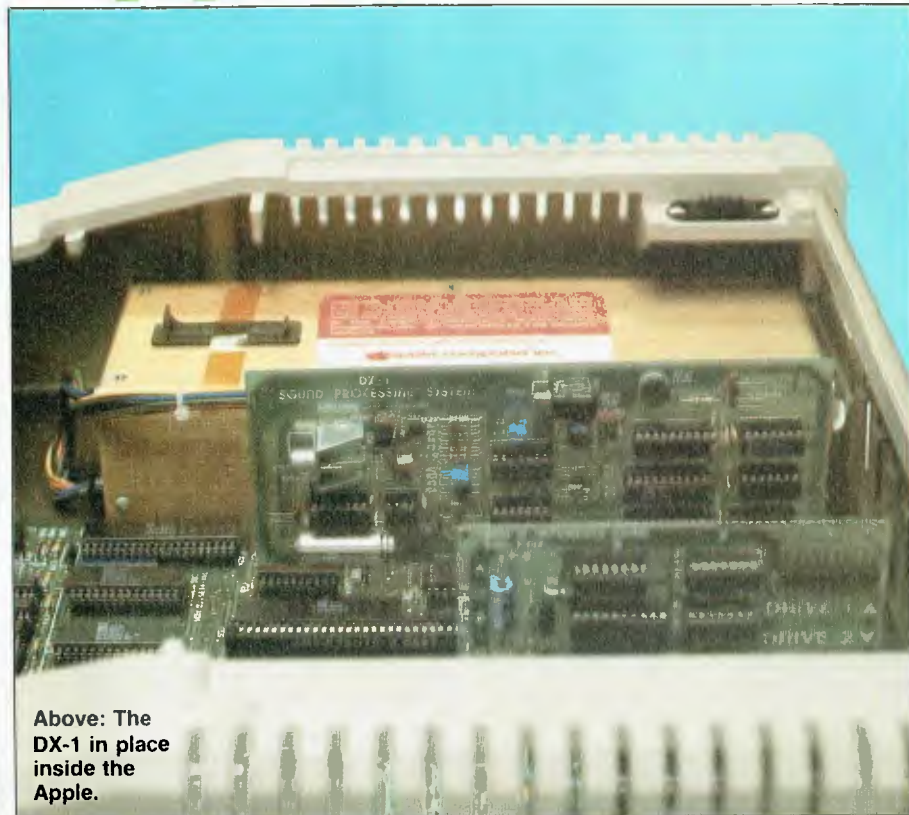


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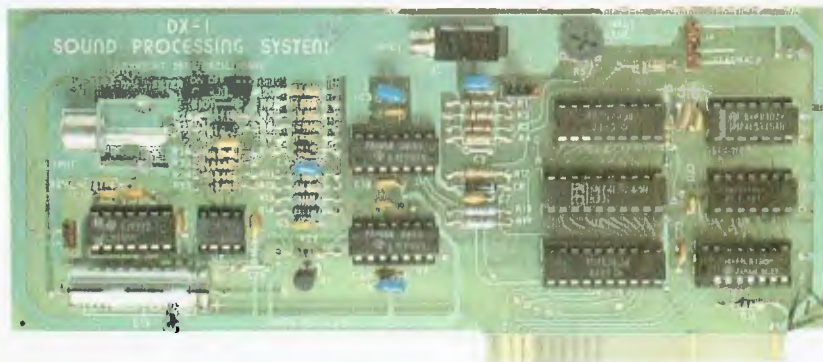
WOW! The novelty still hasn't worn off after hours of messing around with it. The Decillionix is just one of those pieces of modern technology that causes your usually jaded computer journalist to say it twice in the same article. WOW!

Sounding Out Apple

By Evan McHugh



Above: The DX-1 in place inside the Apple.



Right: the DX-1 board.

THE DECILLIONIX DX-1 is a real sound processing system for the Apple II range of computers. It is a hardware board that fits into one of the computer's slots and also requires an external speaker and microphone. The speaker is for the sound to come out, naturally, and the microphone is for you to put some sounds in.

What sort of sounds can you produce? Well, just about any sound you can think of. There are some constraints on what you do with the sounds, for example the length of time the sound is made and the environment in which you are recording it, but if you assume that the sounds will go in wherever it is normal for an Apple II to operate safely, it's not too hard to work out these constraints.

The system operates by using digital-to-analogue and analogue-to-digital converters for the purposes of producing and sampling sounds. The rate of sampling is determined by you, with corresponding quality and time trade-offs. The less you sample a sound the poorer its quality, but the longer the sound can be. Very short times with high sampling rates will give very good sounds.

You can quite happily record voice at a sampling rate around 70, but you're better off going for around 30 samples. This may not appear to make sense – the higher samples should be better – but in practice all the values are inverted, because the number refers to the record time, not the sample rate directly.

Other sounds that are more constant – that is, less detailed in structure than the human voice – are easier to record, since the sampling can be more slack.

Roll with the Software

With the hardware comes the software which will help you get them sounds rollin'. Not only will it record sounds, but there are also some preset rhythms and soundbases. Soundbases are collections of sounds, for example drums or synth noise, that can be played back and are stored on disk. You get three soundbases with the package: drums, weird noises and synth, and there are ten rhythms ranging from rock to waltz.

From the main menu you can go to sound samples, which will play demonstrations of sounds from the presently loaded soundbase. There you can cycle through all the sounds, getting faster with each sound, randomly playing all sounds slowly or quickly, playing one sound slowly or

MUSICAL COMPUTING

quickly, roller coaster playing one sound, falling-object playing it and playing forward and backward. Clearly with a bit of time the possibilities for new sounds are endless.

Moving on, you can play all the rhythms with the sounds, until in menu three you get to the keyboard playing of sounds and recording of new soundbases. At this point you may want to vary pitch in the sounds. To do this you just change the playback rate and thereby speed up the sound. Here you run into the DX1's major problem. While you can play a sound at a higher pitch, this is at the cost of the length of the sound. There is no way around this on the provided software, which isn't to say you could not solve the problem by writing your own software, assuming you know enough BASIC and understand the dynamics of computer sound well enough.

The next two options are the ones that most fully exploit the abilities of the DX1: the auto-sequencer and the unformatted recording facility. The autosequence option gives you the ability to program the playing of a soundbase at any pitch, volume or direction. This process is not a simple one to produce but gives the most control and satisfaction over the result.

The unformatted recording facility gives more control over the envelope, or memory, that contains the sound you are interested in. You can set the start address and the number of pages of memory you want to allocate, all the way up to 96 pages — all the available memory. This gives you more space to allocate to one sound and the ability to determine where that sound begins.

There are utilities to load, save and protect soundbases and sequences, and the manual gives full instructions on the facilities of the system. One useful feature of the manual is the amount of space it gives to a discussion of the theory of operation. This discussion complements the fact that the workings of the entire software are freely accessible to the user, which makes the package very satisfactory to use. Decillionix basically regards this system as the basis for larger systems and as an experimentation device; as such, free access is necessary and therefore provided.

The DX-1 is distributed by Thinking Systems, PO Box 260, Cammeray 2062. ☐

Anyone who has played a game on a Commodore 64 or VIC-20 will be aware of how good the sound can be. It creates a more active and fun environment where, even if not much is happening on the screen, plenty is happening in your ears. Never a dull moment, as the man used to say. So, it is not surprising to find some very good music packages in the Commodore software range.

Commodore

By Evan McHugh



BY FAR the best package for the C64 is the Musicalc suite. 'Musicalc 1' is far more easily described in terms of what it can't do, rather than what it can; it would take forever to describe the extensive features of the package. Even the manual for it is 70 pages long!

Musicalc 1 is described as a "synthesiser and sequencer". As such it can be used as a musical instrument or sound effects generator, compositional or songwriting aid, or

tool for learning music theory and about synthesisers. The package is menu-driven, although some of the menus are very sophisticated and resemble mixing board layouts rather than menus.

Musicalc 1 gives you three voices to work with and facilities to control each voice separately and, where applicable, all at once. There are 32 preset sounds and 32 tunes (or scores) for you to use, and you can save the same number of your own ▶

MUSICAL COMPUTING



An illustrator's image of the Multi-Sound Synthesiser for the VIC-20, from Broderbund Software.

sounds and scores. The package can also be interfaced with other files and programs if necessary. Sounds can be adjusted in a variety of ways, including imposing different waveforms, filters, using gates, synchronisation, varying pulse width, and using transposers for changing the pitch of each voice.

To learn how to use all these bells and whistles you have the manual, which, apart from describing all the different features of the package, also guides you through the use of most of them with carefully laid out tutorials on the synthesiser, sequencer and keyboard. The keyboard, by the way, refers to the keyboard of the Commodore.

Sound quality is largely dependent on the quality of the speaker in your television or your hifi set, both of which can be plugged in through the audio output of the Commodore.

There are two additional Musicalc packages. 'Musicalc 2' turns your Musicalc compositions into standard musical notation so they can be viewed on the screen or printed out. 'Musicalc 3' lets you customise your Commodore keyboard to play any kind of scale you want. It also allows you to transpose, combine and move

keyboard scales, and gives you 80 scales from around the world to play.

Still for the Commodore 64 but on a very different tack is 'Jukebox', from Spinnaker software. This is a music game that plays all kinds of 'jukebox' music while you leap about a maze trying to win gold coins. As you win the coins you can use them to keep the jukebox going, and the game as well. You win gold coins by landing on records and making them grow. Eventually the records become 'gold' and you win a coin.

This may not be the most serious computer music package, but it is a lot of fun and gives a good idea of the musical abilities of the Commodore.

For the VIC

Packages for the VIC-20 are not as sophisticated as those for the C64, but there are still a couple that will give VIC owners lots to do with their computers. The first of these is the 'Multi-Sound Synthesiser', written by Darren Hall and published by Broderbund Software.

The Multi-Sound Synth is limited, and more likely to be of interest to those who want to get some sounds out of the machine without having to

wade through dozens of menus, musical concepts and involved manipulations before getting the least peep out of your little computer. With the Multi-Sound what you see is what you get, so your VIC becomes a pre-programmed synth at the touch of a button.

The options are limited. Mode 1 turns the keyboard into an electronic piano; Mode 2 gives you a piano with a rhythm (drums) behind. Mode 3 gives you programmable background music, or the ability to store a tune and play it back whenever you wish. The fourth and final mode is the white sound synthesiser that supplies some background noises and special effects.

The manual for the package is helpful, although you can get by without even using it, given the high level of user friendliness of the package and its simplicity.

More Sophistication

Getting more sophisticated (it should be, it costs twice as much), is the 'Synthesound', written by T. Dachsel and D. Hassinger. This is a synthesiser like the previous one, with the addition of a lot more bells and whistles so you can have far more influence over the type of sound produced.

Synthesound gives you four controls over the envelope: attack, decay, sustain and release. There are four low frequency oscillators and the three voices give you a four and a half octave range.

The keyboard gives you two octaves to play with at any one time and features a fast attack. A high-resolution piano keyboard display can also be selected.

The sequencer gives a four-voice/20-note repetition of melodies and rhythms which can be saved and replayed as required. Thus the layering effect of multiple instruments is easily achieved. The programming of new sounds is possible under software control, although these may be hard to work out. To make the job a little easier there is a list of examples and how to go about producing them at the back of the manual.

The manual itself is very chatty, but well devised and comprehensive. It often gives instruction in the form of tutorials, and there are plenty of examples to help you on your way.

All the packages for the Commodore 64 and VIC-20 were supplied for review by Imagineering.

MUSICAL COMPUTING

Evan McHugh looked at three packages for Atari computers which give a feel for the range of music applications for this machine. They covered the very easy through to the more sophisticated, but all the packages could be used by the average person without too much study or effort, the only difference being in the quality of the finished work.

Musical Atari

Simple Music Tutor

'The Musical Computer - The Music Tutor' is published by Atari Program Exchange and is described as "an overview of the mechanics of music". It is suitable for ages six and up.

The operation of this program is simple and clear. It takes you through the fundamentals of musical notation, looking at the bass and treble clefs and teaching the scales. Rhythms are also covered by lessons in counting and the values of notes. These are then followed up with exercises to test comprehension; twenty questions are asked on each topic, with the correct answer supplied straightaway if the wrong answer is given.

In the second phase, the computer goes on to teach about notes and rests, dynamic and tempo markings, sharps and flats, and miscellaneous signs and symbols such as accenting notes and repeating measures. At the end of these lessons a single exercise covers all the theory taught.

You would expect colour and sound to help hold users' interest, and there is lots of both. They are also used very effectively to demonstrate some of the concepts described.

This program is available both for older 400 and 800 models and the newer 600XL and 800XL Ataris.

Music 1-2-3

'Music 1-2-3', a much more thorough course, is again available from the Atari Program Exchange. The package was developed by the Minnesota Educational Computing Consortium, and comes as three separate programs.

Music 1 considers terms and notations and provides drills for identifying notes, keys and terms. This is pitched at the lowest level of difficulty, with successive packages getting progressively more involved

and challenging. Various scales are displayed, with sharps and flats, note lengths and rests. The coverage for musical terms is also comprehensive, looking at the use of 57 terms and extending into some that are less commonly used. Enharmonics (intervals less than a semi-tone) are also covered.

The manual is aimed at the teacher, with sections that can be copied and given to students so they can do some written work. A great deal of time is spent explaining the approaches used for teaching with the aid of a computer, and suggesting remedies for any difficulties students may have. There are also lessons designed to familiarise students with the computer, so that the music lessons are not hindered by problems with the machine itself.

The second package is heavily drill-oriented, covering time signatures, notes and rest types and counting. This drill has the student determine the type of note or rest which should be added to complete a measure. There are drills in recognising intervals by ear and by sight, followed by an exercise in recognising incorrect or missing notes. Patterns are played with their notation displayed and the student must determine the correction or addition to be made to the notation.

The final lessons are on rhythm. The first has the computer play three rhythms and the student picks the one that matches the musical notation. Then he is shown a notation and has to match it by pressing any key on the keyboard in the rhythm displayed.

The manual for this lesson is as well organised and clear as the first, and indeed all the manuals display a high level of structuring and careful writing.

The final diskette takes a heavily sound-oriented approach to helping

students in the determination of whole and half steps, recognition of arpeggiated major, minor, augmented and diminished triads, identification of major scales, and so on.

Apart from the obvious challenges a number of the lessons offer, varying levels of difficulty can be attempted. As you become more proficient in recognising something, the recognition can be made more subtle.

'Music 1-2-3' was developed for the older Atari 400 and 800, and needs a special translator for use with the XL models, but we anticipate that this will be sold as part of the complete package for these machines.

Composition

To round out the music range for the Atari there is a cartridge available called 'Music Composer'. This is published by Atari and is considered suitable for ages eight to adult. The term 'music composer' may not in fact be the best description of the package, since composition is only one of the functions it can be used for. 'Music editor' would probably sum up more comprehensively what this package actually does.

The program lets you define music, note by note, in terms of its pitch and duration. Up to ten pieces can be programmed without saving to diskette or tape, and up to four of these can be played at once. Music can also be modified; notes, volume, tempo, key and time signature can be changed.

One nice feature of the package is that when you are writing a piece of music the whole tune is played back after each note is entered so you can hear where you are going. There is also a delete function and a capacity to access the functions from BASIC programs, which opens a much wider scope for manipulation of sounds.

The manual is another plus for this package. Not only does it give an overview of the program, there are also tutorials that show you how to enter, arrange, save and retrieve music. Information is also provided on the music file structure that is used when storing music. Finally, there are a couple of example BASIC programs at the back.

'Music Composer' runs on all the Atari machines, both new and older models.

All the review packages for the Atari were supplied by Futuretronics. □

MUSICAL COMPUTING

Many people support Australia's own Microbee, covering a range of activities from business to games. One of the many applications developed for this machine is the BeeThoven/BeeComposer hardware and software packages. Mike Newnham reviewed them recently.

Bee-Thoven

NO DOUBT all users of the Microbee are familiar with the capabilities of its tone generator. It produces a series of beeps and pops that resemble tunes and, using machine code routines, it can be made to generate quite unusual and effective sound effects. Articles in *Your Computer*, June/July 1983, provided some good routines to this end.

Milan Hudecek of Robotron, a Melbourne-based firm, was the source of those articles. He is now marketing a piece of hardware called 'BeeThoven', which plugs into the MicroBee parallel port and takes sound synthesis on the Bee a few steps further.

Also available from Robotron is a program called 'BeeComposer', which is a machine code music composition program for use with BeeThoven.

The main elements of BeeThoven consist of three tone generators, one noise source and three noise/tone mixers. The frequency of each tone generator is independently programmable over a wide range. Noise may be mixed with each of the tone sources, and a programmable envelope generator is provided for amplitude modulation of each voice for functions such as attack and decay and programmable volume control.

All these features combine to permit the creation of a wide range of sound effects and musical notes. BeeThoven is supplied with a demonstration tape giving some idea of its capabilities, and after using the

package for a time, I believe there are not many sounds it can't reproduce.

A software driver which allows your programs to control BeeThoven is also provided on the demo tape. All commands to control sound generation are passed to BeeThoven via this driver.

There are also two DB-9 plugs mounted in the case. These permit the direct attachment of either Atari or VIC-20 joysticks. The BeeThoven driver is used in this instance to read the ports and return the joystick position to the calling program. I found that running under BASIC the response is a little slow. This is no fault on the part of BeeThoven, but is due to the impracticality of using BASIC for real-time applications. Under machine code the performance was excellent, the only controlling factor being the efficiency of program coding.

The documentation supplied with BeeThoven is first class. It is presented in a spiral-bound booklet which leaves nothing out; each command is fully explained as to its function and use. There is a program on the demonstration tape called 'Tutor', which is used in conjunction with the manual to guide the user through the commands and explore the operation of each. The manual contains a table which specifies the data values required to generate each note of the tempered musical scale, and there

are both BASIC and Assembler source listings of routines to generate various sounds.

While BeeThoven is not physically large, its size belies its abilities. It is a most impressive device. BeeThoven, demonstration tape and manuals together sell for \$89.50.

Very Impressive Composer

For an extra investment of \$29.50 you can purchase BeeComposer, which transforms 'impressive' into 'very impressive'.

BeeComposer is a machine code program which enables the user to create, transcribe and edit musical compositions, and immediately play them on BeeThoven. It supports all standard musical notation and provides for the selection of key signature, time signature and tempo. You can compose in three parts, or voices, and save all your compositions to tape for later playing or editing.

After loading, BeeComposer signs on with its own fanfare, then displays the great staff and below it the lower bass staff. Music is entered onto the staves by means of simple keystrokes. Cursor control makes the tasks of composition and editing very easy indeed. BeeComposer makes very good use of the MicroBee's high-resolution graphics and all characters are clearly recognisable as the musical elements they are designed to represent.

On the 'flipside' of the BeeComposer cassette, a demonstration composition is provided. This is loaded in via BeeComposer and, when played, is a perfect example of the magic of the BeeThoven-BeeComposer symbiosis.

One observation made by a number of people who have seen and heard this package in operation is that it has real potential as a means of teaching music. The user is able to write a piece and play it immediately. He or she may then edit the composition, replay it, and demonstrate instantly the behaviour of each individual element of a piece of music.

Again, the manual supplied with BeeComposer is first class in both quality and presentation. It clearly explains the operation of every command used by BeeComposer, and provides a description of the use and function of each component of music notation.

To sum up, BeeThoven is certainly a worthwhile addition to your system. If you intend purchasing it, then I would recommend that you also buy BeeComposer, especially if you have a musical bent. ☐

Product Review Summary

Product:	BeeThoven	BeeComposer	Combined Package
Ratings:			
Ease of use:	Very good	Excellent	Excellent
Entertainment:	Good		Excellent
Educational:	Fair		Excellent
Documentation:	Excellent	Excellent	
Use of graphics:		Very good	
Value for money:	Very good	Excellent	Excellent
Holds interest:	Yes		Additive
Price:	\$89.50	\$29.50	\$119.00
Review unit from:	Robotron Pty Ltd, PO Box 232, Mooroolbark 3138.		



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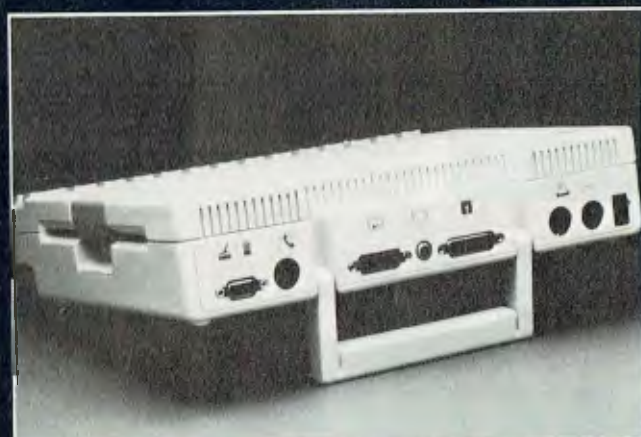
Portables are the fastest-growing area of microcomputing, so it's hardly surprising all the big companies are hastily producing their own version of a portable, from the tiny lap computers to new Osborne-like heavies. IBM has released the Junior, which has met with a distinctly mixed reaction, and Apple has now come out in direct competition with the IIc.

APPLE'S Portable Bombshell

By Jane Mackenzie

LET ME SAY right from the start that this review is not going to concentrate on the technical aspects of the Apple IIc. I'm a user of computers, not a hacker or a programmer, and the IIc is aimed at users; unlike other members of the Apple II family it's designed for people who aren't so much interested in what goes on inside their computers as in what they can *do*.

The biggest shock for Apple lovers is that you can't open up the IIc and get inside it; there are no expansion slots, and opening up the case in fact voids the warranty. This means you won't be able to use the IIc in all those unusual applications people have found over the years for the II, II+ and IIe: controlling the temperature of pottery kilns, interacting with synthesisers, turning lights on and off





Above: You can even use the Apple IIc in your penthouse!

Top left: The IIc viewed from above.

Left:
Side view showing the built-in 13 cm disk drive.

Far left:
At the back of the IIc are ports for a printer, plotter, monitor, TV, modem, second disk drive, joysticks and other games controls, and a mouse.

at random intervals for security reasons, and so on.

However, what you can use the IIc for is what probably 90 per cent of people want computers for anyway: word processing, financial planning (using spreadsheets), list management (using database programs), education, graphics, communications and games – and its portability means you can do all these things both at home and at the office.

Designer Apples

The IIc isn't immediately recognisable as a member of the Apple II family;

even the colour is different! Apparently the people at Apple have realised that if they want their computer to be used in the true portable sense, it's got to *look* good enough to sit in the living room. As John Sculley, Apple's president and chief executive officer, said, "If people are going to have a computer in their home, it has to look like something you'd be proud to display all the time. It can't look like a typewriter with a TV on top of it or it will spend a lot of time stuffed in a closet."

So Apple commissioned Frog Design, a West German firm which

The Apple IIc with its portable monochrome monitor (and stand), both in Apple's new 'Snow White' style.



SPECIFICATIONS AND REPORT CARD

Unit:	Apple IIc
Made by:	Apple Computer Inc.
Processor:	65C02
RAM:	128K
ROM:	16K including Applesoft BASIC, disassembler and monitor program
I/O:	Ports for modem, printer/plotter (serial), second disk drive, mouse, joysticks or other games controls, TV, monitor, flat LCD screen; no other expansion slots available
Languages:	Applesoft BASIC (built in), Pascal, FORTRAN, SuperPILOT, Logo, 6502 Assembly Language
Operating Systems:	ProDOS, DOS 3.3, Pascal
Keyboard:	63-key QWERTY, switchable to Dvorak layout
Display:	Monitor or colour TV, 80 or 40 columns, upper and lower case
Graphics:	Three modes available: low-resolution, 40 by 48 pixels in 16 colours; high-resolution, 280 by 192 pixels in six colours; ultrahigh-resolution, 560 by 192 pixels in 16 solid colours
Sound:	Built-in speaker with volume control and headphone jack socket; five-octave range
Peripherals:	Monitor, printer, plotter, modem, mouse, joysticks and games controls; flat LCD screen to be available late this year
Best points:	Range of programs available, portability, documentation/tutorial
Worst points:	Limited expansion, can't run CP/M programs, a bit slow

Ratings:

Documentation:
Ease of use:
Functionality:
Support:
Speed:
Value for money:

Excellent Very Good Good Poor

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Price: \$1775 incl. tax, \$1565 excl. tax; matching monochrome monitor — \$335 incl. tax, \$295 excl. tax

Review unit from: Apple Computer Australia, 37 Waterloo Rd, North Ryde 2113. (02) 888-5888.

also designed the Sony Walkman, to design the Apple IIc and its peripherals. The result is the 'Snow White' look, as Apple has christened it: an ivory-coloured, fine-grain-textured case, with slightly darker toning beige keys and a small, brightly coloured Apple logo in the top corner. (A little bird told us that when Frog Design was developing the new Apple look, it christened the

new colour scheme 'Apple Fog', but the people at Apple weren't exactly rapt about the images that name conjured up; hence 'Snow White'.) All future Apple II products will use the 'Snow White' design.

The IIc is a true portable; it weighs 3.5 kg, which is slightly hefty to carry around for any length of time, but is excusable by the fact that this weight

does include a built-in 13 cm disk drive — all in the one box.

Similar in size to the average office binder, the IIc uses its foldaway handle as a stand when in use, to bring the computer to the correct height and angle. The 63-key keyboard feels slightly 'rattly' compared with the IIe's, but once you're over the initial adjustment to a new keyboard it's certainly able to cope well with a touch typist's speed. The only slight annoyance I found was that the backward slash key had been placed between the 'z' and the left shift key; I kept hitting it by mistake instead of shift.

Incidentally, we in Australia are getting the 'international' version of the keyboard; the North American version has a couple of keys in slightly different positions — including the offending backward slash.

Adding Things On

Despite the fact that you can't open up the IIc and plug in boards to operate peripherals, you can attach a good range of I/O gear to it via the built-in plugs at the back.

As well as the on/off switch on the back, there are seven ports available — each with a different configuration and distinguished by an icon etched next to it, so it should be impossible to plug a peripheral into the wrong slot. Apple has in fact designed a range of peripherals to match the IIc, but older Apple accessories such as the Imagewriter printer, joysticks, hand controllers and the colour plotter are said to work with it.

In all, you can operate your IIc with: a printer, monitor, TV set, plotter, extra disk drive (one only, unlike the IIe), modem, mouse, joystick and other games controllers, and, once it's released, a specially designed flat-screen portable display. This 80-column by 24-line liquid crystal display screen weighs less than 1.25 kg, and will make the IIc truly portable; it and the screen will fit comfortably into a briefcase for full computer operation anywhere that power is available. The flat screen is expected to be available towards the end of this year.

The present monitor for the IIc (in the 'Snow White' style, of course)

displays 80 columns with absolutely no wobble or flicker on its 215 mm (8.5 inch) screen, although the individual characters are rather small. The monitor costs an extra \$335 (\$295 ex. tax), and if you're going to use 80-column applications at all a monitor is a must; the IIc will not display 80 columns on a TV screen. The 80/40-column switch is handily located just above the keyboard, but, as you're reminded repeatedly in the manual, must be pressed *before* you switch on the computer. If you try to run a program with the wrong switch setting, you simply get an error message, and have to switch off and boot up from the start again.

If you're really serious about using the IIc as Apple wants people to use it – as a business machine you can also use at home – a monitor becomes an essential purchase. You simply can't use word processing and spreadsheet programs without one, so you have to add an extra \$300 to your computer budget when working out what you need to buy.

I tested out the portability of the IIc system by taking home the computer and monitor from our office one weekend. The computer itself is easy to carry; the plastic-coated handle doesn't slip or dig into your fingers. The monitor has a slot at the top to slip your fingers in for carrying; while it's adequate, I'd have felt happier about carting it around if the slot had been a bit deeper. I kept feeling my fingers would slip out and it would crash to the ground!

Unfortunately, computer and monitor don't complete the system – the IIc runs via a power transformer, which you have to carry with you too, and that weighs about as much as the IIc itself! This, complete with the necessary power and monitor cables, means you tend to finish up with a bag full of power pack and cables, plus the computer, plus the monitor. It's still feasible to transport the system between home and office, but I don't think I'd like to do it on a rush-hour train!

More Peripherals

As well as being able to operate a colour or monochrome monitor, the IIc comes with an RF modulator to

attach to your TV set; it's not an optional extra as it was on the IIe.

The Scribe printer for the IIc (supposed to be available here this month) uses the new thermal transfer technology to achieve clear, quiet printing at two speeds. In draft mode it prints 80 cps, while for higher-resolution near-letter-quality mode it runs at 50 cps. Shifting between the two speeds is achieved by flicking a switch on the front panel or by

naturally included the idea that it would run the vast majority of the estimated 10,000-15,000 programs already written for the Apple II family. This is no doubt the reason Apple opted for a 13 cm built-in drive rather than the more compact microdrive. It is claimed that the IIc will run all software for the IIe except:

- Any program using the CP/M operating system (there's no



The IIc with its 80-column by 24-line flat LCD screen, to be available later this year, which will make the computer more truly portable.

issuing a software command. The Scribe can also print graphics; a 20.3 cm by 19 cm graphic image is said to take less than four minutes to print.

The Scribe is small and lightweight (5.26 kg), and offers various typestyles and sizes as well as such features as underlining, superscripts and subscripts. It can use either a black or a three-colour ribbon to produce several colours, and does not require special paper.

A second disk drive, called the Disk IIc, can be added, to provide another 143K of storage. Nowhere in the IIc literature is it stated whether the IIc will run with the older IIe disk drives, or with third-party hardware.

As well as joysticks and games controllers, the IIc has a built-in port for a mouse. The AppleMouse IIc comes with MousePaint software and a training disk, and much of the software being written or 'enhanced' from Apple IIe programs for the IIc will take advantage of the availability of a mouse as a cursor-control tool.

Speaking of Software ...

The whole concept behind the IIc

equivalent of the CP/M boards available for the IIe).

- Any program using an Apple operating system before DOS 3.3, although it's claimed to be simple to reformat to 3.3.
- A program in which the developer has incorporated a copy protection mechanism or used reserved memory locations not recommended by Apple.
- Programs using add-on boards not available for the IIc.

Apple is conducting compatibility tests on Apple II programs to determine which are fully compatible with the IIc, and is publishing an updated list of findings every two months (in the USA, that is). Of the programs tested to date, 90 per cent are claimed to run on the IIc. Apple expects software developers to resolve most incompatibility problems by releasing new IIc versions of their packages. Talk to your dealer about availability of programs and of this compatibility list.

Meanwhile, Apple and a number of independent software publishers have already released 16 best-selling programs in a form which takes

advantage of the IIc's increased memory: 128K RAM instead of the IIe's 64K.

One of the products released by Apple is 'AppleWorks', an 'integrated' package including a word processor, database management program and a spreadsheet. This program was newly arrived in Australia as we were reviewing the IIc, and although we managed to get hold of a copy there was no manual available. Undeterred, I muddled through a few of the sample programs and received the impression that for the average user this integrated package would be the answer to most computing needs, but a closer review will have to wait till we can get a better look at the software.

The other packages especially released for the IIc are:

- Apple Access II (communications software)
- Bank Street Writer (word processor from Broderbund Inc.)
- Dollars and Sense (from Monogram/Tronix Publishing Inc.)
- Multiplan (from Microsoft)
- PFS:File and PFS:Report (from Software Publishing Corp.)

For home education there are the following packages:

- Apple Logo II (from Apple)
- Crypto Cube (from Designware Inc.)
- Fact and Fiction Toolkit (from Scholastic Wizware)
- Grandma's House (from Spinnaker Software)
- MasterType (from Scarborough Systems)
- Rocky's Boots (from The Learning Company)
- Stickybear Shapes (from Xerox Education Publications)
- The Apple Education Classics (from Apple)

Finally, there are two games already upgraded for the IIc:

- How about a nice game of chess! (from Odesta Corp.)
- Zaxxon (from Datasoft Inc.)

Ask your Apple dealer about the availability of all these programs in Australia. As further software is enhanced and developed for the IIc it

will be released bearing a red and yellow sticker saying 'Works on the Apple IIc', so let's hope the problems many people found when trying to run II+ programs on the IIe are avoided.

What's Inside?

Although I promised this review wouldn't be technical, we can't write about a computer without telling you a little about what goes on inside it.

The heart of the IIc is a 65C02 microprocessor — similar to the 6502 of the original Apple II family, but based on CMOS technology. The main advantage of CMOS processors is their low power consumption and low heat generation; the disadvantage is that they operate more slowly. This is noticeable in the IIc if you're used to the IIe, but since the IIc isn't aimed at number-crunchers users may not find the slower speed a problem. Since CMOS processors, with their low power consumption, can be battery-operated, we wonder if Apple is planning to release a battery system for the IIc to make it more fully portable.

As mentioned, the IIc has 128K of RAM, plus 16K of ROM. Applesoft BASIC is resident in ROM, as in the IIe, and the disassembler and monitor program are also in ROM.

As well as the switch to change between 40 and 80 columns, there is a switch on the front of the IIc to change between the standard QWERTY keyboard and the faster Dvorak keyboard. I saw this operating on a demonstration model, and literally all that was required was a press of the switch before power-up and some form of key-change or overlay to display the new keyboard layout. Unfortunately, I couldn't get this keyboard changeover working on the review model, although I suspect this was because I was largely working with demonstration and training programs rather than actual data. Although relatively few people use the Dvorak keyboard at present, those who do claim it increases typing speed by up to four times, so its inclusion on the IIc could be a good piece of forward-thinking.

The built-in speaker's volume can be controlled by a knob on the left of

the computer, and a headphone jack is also provided. The IIc's audio system is said to have a range of five octaves, and one of the demonstration programs included a very clever rendition of a Mozart sonata to show off its capabilities!

The IIc can run three operating systems: ProDOS, Apple's newly developed OS; DOS 3.3 (but no earlier versions); and Pascal. As well as the built-in Applesoft BASIC, Apple supplies Pascal, FORTRAN, SuperPILOT, Logo and 6502 Assembly Language for the IIc.

Learning to Use it

A basic concept behind the IIc is that it is an off-the-shelf, ready-to-use computer system. If you buy the basic system, it comes in one carryable box with a handle at the top, so you literally carry it out of the shop to your home or office, plug it in (it's easy — even I managed it first try) and off you go.

Inside the box are the computer itself, a video cable and RF modulator, the power transformer and power cable, the warranty card, three manuals and five diskettes. The manuals and the diskettes together form a comprehensive training program for the IIc; work through from beginning to end and you'll not only learn how to operate this particular machine, but also get a grounding in what a computer is and the applications you can use it for.

The first manual concerns itself solely with setting up the IIc, showing you with both instructions and clear photographs exactly which accessories attach to which ports at the back of the computer. As I said before, setting up is simplicity itself.

The second manual is the 'Interactive Owner's Guide', which operates in conjunction with four of the diskettes to take you through from an introduction to computing to a demonstration of integrated word processing, database management and spreadsheet programs. This manual is an excellent piece of documentation; it assumes no prior knowledge, never explains things in unclear terms, and backs up the tutorial diskettes both with summaries of their contents and extra information.

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The Apple IIc in its 'off-the-shelf' box; you just carry it home from the shop, set it up, and away you go.

The tutorial diskettes themselves are mainly double-sided, and comprise the following demonstration programs:

- Apple Presents the IIc (similar to 'Apple Presents Apple', which came with the IIe) introduces new users to the keyboard and a few other basic concepts.
- The Apple at Play not only includes a couple of games, but also an example of a home finance program (work out the amortisation on your home loan — if you want to be depressed, that is) and the aforementioned Mozart sonata.
- The Apple at Work introduces users to the concepts of word processing, spreadsheets and database management, and leaves them with whetted appetites to try the wonders of integrated software packages such as AppleWorks.
- The Inside Story is for those who want to know a little about what makes the computer work, and introduces the concept of saving data on disks.
- Exploring Apple Logo introduces the Logo programming language for both children and home users.
- Getting Down to BASIC is an introduction to BASIC programming.

If new users work their way through all these diskettes together with the owner's guide, they should emerge after several hours feeling happy and confident with their IIc and their own abilities to be able to 'get into' computing, and ready to start work with a 'real' program. As a

beginner's tutorial, I can't recommend it too highly.

The third manual and the fifth diskette contain the system utilities — instructions on formatting disks, creating files, setting up for different printers and so on. The first thing it shows you is how to copy the System Utilities disk (which includes formatting a blank disk) — a good introduction to the concept of backups!

If you want to know all the ins and outs of the inner workings of the IIc, it's available in the form of the *Apple IIc Reference Manual*, which is obtainable separately from Apple dealers. This includes details of memory addresses, firmware listings, timing charts and the like, so you don't *have* to be permanently ignorant about what makes your IIc tick.

In the Marketplace

According to Apple in Australia, the concept of the IIc quite coincidentally came about at the same time as IBM was planning the Junior; the fact that they're in direct competition with each other is quite coincidental. Whatever you believe about that, it is a fact that there is no other computer, except for the Junior, in quite the same category as the IIc — portable, but with built-in disk drive and plenty of software.

Since the PCjr isn't yet available in Australia, and shows no imminent signs of being so, it wouldn't surprise me if Apple walked away with the 'powerful portable' market in this country. Even in the US, where the IIc was launched with great fanfare and ra-ra (and dinner and drinks for 4000 people), Apple claims to have taken orders on debut day for 50,000 machines in seven hours. It took Apple two and a half years to sell that many of the original Apples, and IBM seven months to turn over that number of PCs. When Apple brought out the Macintosh, its goal was to sell 50,000 in 100 days, an ambition which it claims to have beaten by 20,000 units. All in all, I think recent predictions that Apple's death knell has sounded since IBM joined the microcomputer market could be somewhat off the beam.

However, with the introduction of the IIc, Apple is undercutting its own

market for the IIe. There has therefore been a rethink about the target market for the IIe, and a consequent 'price restructuring' (it makes you wonder what these machines actually *cost* to produce, the way the prices can be changed at the drop of a hat to suit the market trends ...). The IIe is now being aimed primarily at the education market — where a built-in disk drive in every unit is not required — and at more dedicated hobbyists who still want to make their computer do all sorts of fancy interfacing with the real world and thus need the IIe's expandability and adaptability. The IIe will consequently be considerably cheaper once the IIc is released than it has been till now. Apple is also working on a new networking system for IIes in classrooms, to be released later this year.

However, if I were a computer user looking for a machine that's powerful enough to be useful, portable enough to be used at home and at work, and versatile through its wide range of software, I'd buy a IIc. It's obviously not for everyone — not for hackers, and not for big businesses or number crunchers. But for the average user, it's as near to perfect as you'll get.

As for service, Apple's current aim is to achieve 24-hour turnaround from the time of delivery to a dealer to the computer being fixed. The only time you should have to wait longer for repairs or service is if you're unlucky enough to take your Apple in to a dealer who's had another machine with the same fault in the same day; then he'd have to order another part. If Apple achieves this service aim, they'll be setting an example the rest of the industry could do well to follow.

The recommended retail price for the IIc is \$1775 including tax (\$1565 without tax). By the time you read this article it should be available off-the-shelf from Apple dealers and perhaps other outlets in department stores which Apple is in the process of arranging. Some of the peripherals won't arrive till later this year, and you'll need to enquire about the availability of the new IIc software, but the basic system is here now; for once we didn't have to wait a year or more for a new computer to reach here from the US. □

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If there is something you want clarified after you have purchased META4, ring us up. Maximum time for any one call 15 minutes.

BASIC CONCEPTS

META4 uses familiar concepts to aid you in it's use:

ROOMS — META4 has many rooms in it. Each room is used to store information about a different type of thing.

QUESTIONS & ANSWERS — when you go into a ROOM META4 asks you QUESTIONS about the type of thing (e.g. CUSTOMER, INVOICE, PRODUCT, etc) held in the ROOM, and stores away your ANSWERS.

RECORDS — META4 stores the ANSWERS to a set of QUESTIONS in a room as a RECORD. There can be many RECORDS in a room.

DOORWAYS — You can move from ROOM to ROOM through DOORWAYS. META4 automatically relates information in one ROOM to information in the next.

BUILDINGS — A building is a collection of related ROOMS and DOORWAYS. A BUILDING corresponds to the traditional concept of a Data base.

META4 IS PORTABLE

Any applications you develop under META4 will run without change on any computer that META4 runs on.

EASE OF USE

- SIMPLE and CONSISTENT
- HELP — 3 levels, for the current:
 - BUILDING you are in
 - ROOM you are in
 - QUESTION being asked.
- 3 TUTORIALS.
- USING META 4
- DESIGNING WITH META 4
- META 4 EXAMPLES

Designed from the ground up to be totally consistent, and as easy to install, learn and use as possible. You can quickly learn to use the system.

META4 IS EXTENDABLE

All the features of the system are fully extendable to your own applications. You can add your own BUILDINGS, ROOMS, DOORWAYS and QUESTIONS. You can define your own maps, HELP text and tutorials.

WRITTEN IN ITSELF

Only META4 is powerful and elegant enough to use itself. All the system documentation is stored in standard META4 BUILDINGS, and printed out as a standard META4 report. When you use META4 to define a new application, you answer standard META4 questions in standard rooms in a META4 building.

DETAILED FACILITIES

- Menu driven
- True DATA BASE — RELATIONAL/NETWORK.
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The GREAT AUSSIE SOF

The Labtam 3006 is an Australian-designed and built microcomputer that meets the highest specifications and requirements. It was originally built by the company for its own use in scientific applications, but proved to be such a top performer that other companies wanted the chance to use it — so Labtam started building them commercially.

You can win a Labtam 3006 plus many extras, worth a total of over \$14,000, by entering the Great Aussie Software Competition.

The Prize ★

The winner of the Great Aussie Software Competition will receive a model 3006 floor-standing Labtam computer, including a 15-slot IEEE-796 multibus motherboard and switched mode power supply.

Included within the cabinet is a Z80A CPU running at 5 MHz with 128K RAM, and an Intel 8086 CPU running at 8 MHz, also with 128K RAM. Labtam is also supplying an extra 128K of RAM, bringing the total to 384K.

CP/M-86 for 16-bit operation and CP/M 2.2 for 8-bit operation are included, as well as MS-DOS. Labtam is also giving the winner copies of Wordstar Professional and Supercalc 2. Battery back-up is supplied for the real-time/date clock and time counter.

The desktop console is Labtam's own high-resolution terminal and keyboard, which enables the provision of REGIS graphics. Storage on the system is via a 20 cm floppy disk drive providing 1.2 megabytes of storage, plus a Winchester disk drive with 10M.

To complete this outstanding computer system, Anderson Digital Equipment has donated a **Mannesmann Tally MT 160 printer** to provide output from the machine. The MT 160 is a high-resolution printer with graphics capability, and prints at 160 characters per second.



RULES

1. The program must be in a language compatible with CP/M 2.2, CP/M-86, MP/M-86, MS-DOS or IDRIS. In the event that a program is submitted under MS-DOS, it must not be hardware dependent (i.e. IBM-PC).
2. The program must be submitted on an IBM-compatible, single-sided, single density, 20 cm diskette, or an IBM-compatible (under the above operating systems) 13 cm diskette.
3. A short written resume of the program should accompany the entry, and it should be in a printed listing or typed form.
4. All entries must be accompanied by an original coupon from 'Your Computer'. The coupon must be signed, and in the case of a joint effort from, for example, a company, the signature must be by someone authorised to sign on behalf of the company.

5. The judges' decision is final and no correspondence will be entered into over the competition, nor any interviews granted.
6. No employees or relatives of the Federal Publishing Company Pty Ltd, Eastern Suburbs Newspapers Pty Ltd, or Labtam International Pty Ltd, their advertising agencies or associated companies, are eligible to enter.
7. The competition will run in 'Your Computer' for four issues from June to September 1984 inclusive, and entries will close by the last mail received on September 30, 1984.
8. Entries which do not comply with these conditions, including entries received after the closing time, will be disqualified.
9. All entries, whether disqualified or not, will be returned to the appropriate participants.
10. The winning program remains the property of the author for him or her to use and apply as

desired.

11. The prizes in the competition have no monetary refund value, are not transferable, and cannot be substituted or varied.
12. The competition will be judged by a panel of experts, which will use its best endeavours to see that every entry is properly considered.
13. Any omission to consider any entry and/or error by the judges or by any representative of Labtam International Pty Ltd or Federal Publishing Company Pty Ltd shall not invalidate the competition or give rise to any rights in any competitor to take proceedings against either of the promoters of the competition or any officers or employees of either of these companies at law or in equity on any account.
14. All competitors taking part agree as a condition of entry to accept the judges' decision as final and binding.

SOFTWARE COMPETITION!

All you have to do (all! we say) is write an original, innovative and useful program for any application you choose, and send it in to *Your Computer* for evaluation. Our panel of judges will whittle the entries down to a short list, and then subject these shortlisted finalists to a thorough scrutiny and workout.

Our judges are all people well experienced in the world of programming: Les Bell, founding editor and now contributing editor of this magazine, and a well-known software consultant in his own right; Matt Whelan, former Managing Editor of *Your Computer* and now head of this publishing company's EDP department; and Dr Barry Thornton PhD, DSc, dean of the Faculty of Mathematical and Computing Sciences at the New South Wales Institute of Technology. Dr Thornton is also Chief Executive Officer of the Foundation for Australian Resources — which he set up nine years ago — and was Technical Director and General Manager of Honeywell for eleven years.

Format

We'd like to be able to test your programs on a Labtam computer, so here's some information about its specific escape sequences and so on.

A Labtam terminal behaves like an ANSI-standard terminal, or alternatively can use VT52 cursor positioning escape sequences. The people at Labtam have also implemented a subset of the DEC REGIS graphics set, although they warn

that they haven't incorporated all the more intricate options.

If you'd like more details about the Labtam escape codes, write to us and we'll send you a photocopy of the actual manual — we just don't have enough room here to list them all. However, if you follow the above standards and don't go into the intricacies of various subsets, Labtam tells us it should all be straightforward.

More Prizes ★

The second prize, a **Mannesmann Tally MT 80 Spirit printer**, has also been donated by Anderson Digital Equipment and is worth around \$800. It prints at 80 characters per second and provides such features as underlining, bold face, super and subscripts, italics and a special graphics mode.

Third prize, donated by Magmedia, is **three boxes of Xidex precision flexible disks**, either in 20 cm or 13 cm format, as the winner wishes. These diskettes retail at between \$60 and \$70 per box.

Fourth and fifth prizes are two years' and one year's subscription to *Your Computer* respectively.

Aside from winning one of these marvellous prizes, the winner's name will be publicised nationally, and he or she will retain ownership of the winning program to market, publish or otherwise use as they please.

The winning program does not necessarily have to be super-complex or business-oriented. The spirit of the competition is to reward original Australian initiative in producing a well-written, well-structured, useful and innovative program. It should reflect an original approach to solving a problem (regardless of its size or complexity) by the use of a computer.

ENTRY FORM

GREAT AUSSIE SOFTWARE COMPETITION

Please complete this entry form and send it, with your program and resume, to **Great Aussie Software Competition, 'Your Computer', 140 Joynton Avenue, Waterloo 2017.**

In the event of a joint entry, please list separately the names (and, if applicable, job titles) of the competitors.

Name 1 (and job title):

Name 2 (and job title):

Name 3 (and job title):

Address:

Postcode:

Language of Entry:

I declare that the attached program is original and has been written by me/my group*.

*Delete as necessary.

Signature:



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Leading the Field.



Tandy was one of the early starters in the personal computer game, with the 1977 launch of the TRS-80 Model I. Relying solely upon its own distribution network, it has doggedly promoted its own operating system – TRS-DOS – and its own way of doing things. With the TRS-80 Model 2000 it has broken with tradition, as
Les Bell reports.

TANDY MODEL 2000

I COULD NEVER quite appreciate the Tandy 'technocrap' silver and grey styling, and they lost me forever (I thought) with the introduction of TRS-DOS. The TRS-80 family, or at least the eight-bit branch of it, was just too far away from the mainstream. Rather after the fashion of some mainframe companies, Tandy tended to give the impression that you would be 'locked in' to its way of doing things, despite the considerable amount of software available from third parties.

When it decided to make the move away from the eight-bit world, the company introduced the Model 16, a 68000-based system which uses the XENIX version of the UNIX operating system. This machine is perhaps ahead of its time: while the rest of the world pauses to work with the 8088, the 68000 is largely being ignored; and by the time we start looking at more powerful processors again it seems that the 68000 will be largely overshadowed by the 16032 and 80286.

Perhaps realising this, the Tandy designers have taken a step back to orthodoxy in the Model 2000. At the same time, they have not forsaken the quest for performance. By using the 80186 processor – and at a relatively high clock speed (8 MHz) – they have been able to achieve a machine that outperforms the 68000 school, yet is compatible with the IBM PC way of doing things.

The Model 2000 is without a doubt the best thing Tandy has ever done. It is well conceived, well designed and well thought out. It brings Tandy back to the mainstream of PC software activity, where it can take advantage of products which have become 'industry standards' like dBase II, Microsoft Word and others.

The Model 2000 has been designed to be MS-DOS compatible, rather than IBM PC compatible (though some IBM PC programs will run). I would guess that the thinking of the designers was as follows: to maintain IBM PC compatibility, we will be forced to use the same memory map, the same graphics resolution, the same keyboard design, the same expansion bus and a number of other 'features' which in today's technology are a liability – and even then, we still wouldn't be able to run all IBM software. It is better to run the same operating system, with a similar ANSI-standard screen driver, and accept the incompatibility. Our higher performance will outweigh the compatibility issue, and we have enough clout to be able to get all the major software rewritten for our machine in any case.

That's a powerful argument. There's no doubt that the performance of the Model 2000 is much higher than that of the IBM PC, and that Tandy is organising software for its machine. An examination of the US market shows, however, that the less compatible a machine is with the IBM PC, the less well it does in the marketplace, all other things being equal. Thus, highly compatible 'clones' have done well with virtually no promotion, while less compatible machines from companies with bigger budgets – like the TI Professional and the Wang PC – have not done as well, despite improved performance.

However, none of these machines has had as much going for it as the Tandy Model 2000. The performance scales are weighed heavily in favour of the Model 2000, as our benchmarks showed. Of the machines benchmarked

recently, the Model 2000 was the top of the list. It executed the Sieve of Eratosthenes benchmark (programmed in Microsoft C) in 3.82 seconds, only 62 per cent of the nearest competitor's time, the Sord M68, which is a 68000 processor running at 10 MHz (its time was 6.13 s, programmed in the CP/M-68K C compiler).

Other benchmarks in MS-BASIC revealed a similarly high performance. The only machine which got near the Model 2000 (Sieve: 789.89 s) was the Dulmont Magnum (Sieve: 957.97 s).

Our final benchmark was a program in dBase II which creates a file of 1000 records (Stage 1), indexes it (Stage 2) and then finds 12 records, deletes them and packs the file (Stage 3). This benchmark is designed to give some indication of the machine in a commercial application, where processor speed is less significant and disk performance becomes more important.

Here, the Model 2000 significantly outperformed the competition in stage 1, but dropped back in stages 2 and 3. The reasons for this are two-fold: firstly, the first stage of the benchmark involves a fair bit of processor activity as it generates random numbers (remember dBase II is an interpreter), and secondly it generates the file sequentially without much track-to-track head motion. In stages 2 and 3, by comparison, there is a lot of track-to-track motion of the disk drive head, and here the 13 cm floppies on the machine proved to be the weak link in the chain. A vintage 1979 20 cm disk system with a 2 MHz 8080 processor did almost as well in these stages.

The moral of the story here has two levels of interpretation. One, it



The Tandy 2000 demonstrating a graphics program, flanked by some of the wide range of software it will run.

SPECIFICATIONS AND REPORT CARD

Unit:	TRS-80 Model 2000
Made by:	Tandy Corp.
Processor:	80186
Clock speed:	8 MHz
RAM:	128K minimum, 768K maximum
ROM:	Bootstrap only
I/O:	One serial, one parallel Centronics
Languages:	BASIC as standard, plus MS-DOS languages
Keyboard:	90-key QWERTY, numeric and cursor pads, 12 programmable function keys
Display:	80 by 25 alphanumeric display
Graphics:	640 by 400 mono or colour with option boards
Peripherals:	Printers, modems, you name it
Expansion:	Four slots available
Best points:	Fantastic speed, good graphics
Worst points:	Disk drives should be faster

Ratings:	Excellent	Very Good	Good	Poor
Documentation:	•			
Ease of use:	•			
Functionality:	•			
Support:	•			
Value for money:	•			

Extras included:	Mono graphics and colour graphics kit
Options:	Hard disk (10 Mbyte), mouse/clock board
Price:	\$4450 incl. tax (Model 26-5103 with two floppy drives); \$6950 incl. tax (Model 26-5104 with 10 Mbyte hard disk and one floppy)
Review unit from:	Tandy Corp. of Australia

of I/O by, say, moving to hard disk, then the processor becomes a significant factor again. In short, then, for commercial applications, you won't realise the full benefit of the 80186 processor in the Model 2000 unless you use the hard disk-based version. You generally would for commercial applications anyway, and the Tandy price for a hard disk version is good value compared to floppies only.

On the Outside

The Model 2000 is finished in an off-white (cream?) moulded resin case with comfortable rounded edges and a pleasing appearance. At the front left is a black panel containing a silver name badge and the power and reset switches. Both are rocker types and the power switch contains an indicator. At the right of the front panel are two half-height floppy disk drives, each with a capacity of 720 Kbytes.

The blank front centre of the front panel optionally masks a built-in 10 Mbyte hard disk drive (another drive can be attached externally).

Under the front panel is a recess which helps to reduce the desk space occupied by the machine by at least partially sheltering the keyboard when it is not in use. The keyboard itself is comfortable and well thought out, with separate numeric and cursor pads (the latter in an inverted T), and 12 function keys across the top of the keyboard where templates can be used to label them. The keys have a good feel, and the rounded edges of the keyboard make it comfortable to use.

At the rear of the machine, the lower edge carries the connectors for the standard Centronics parallel and RS-232C serial ports, while the right side carries the power connector. There are four slots for expansion boards in a steel-lined chassis; each board is carried on a metal tray which bends up to form a back panel to carry connectors. Boards are held in place by simple push-locks.

Mechanically, the Model 2000 is a good balance between ruggedness and light weight. It is solid enough to withstand the usual (and most unusual) stresses of office life, yet won't break your back as you carry it to the car.

The standard system is completed by a screen: either monochrome (what we used to call black-and-white,

shows that improvements in the silicon technology – such as faster processors – have less impact than expected unless they are accompanied by improvements in other elements of the hardware such as the disk drives. This is something that will have to be borne in mind by hardware designers.

For those who are contemplating buying the hardware, the benchmark reveals something else. The Model 2000 will be significantly faster than

8088-based machines (like the IBM PC) on straight sequential file processing (like running compilers and so on), and there's just no comparison on processor-bound tasks like generating prime numbers. But where disk I/O takes up a significant fraction of the time – as in commercial applications or with indexed databases – the improved performance of the Model 2000 processor is less significant.

However, if you reduce the impact



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INPUT TERMINALS
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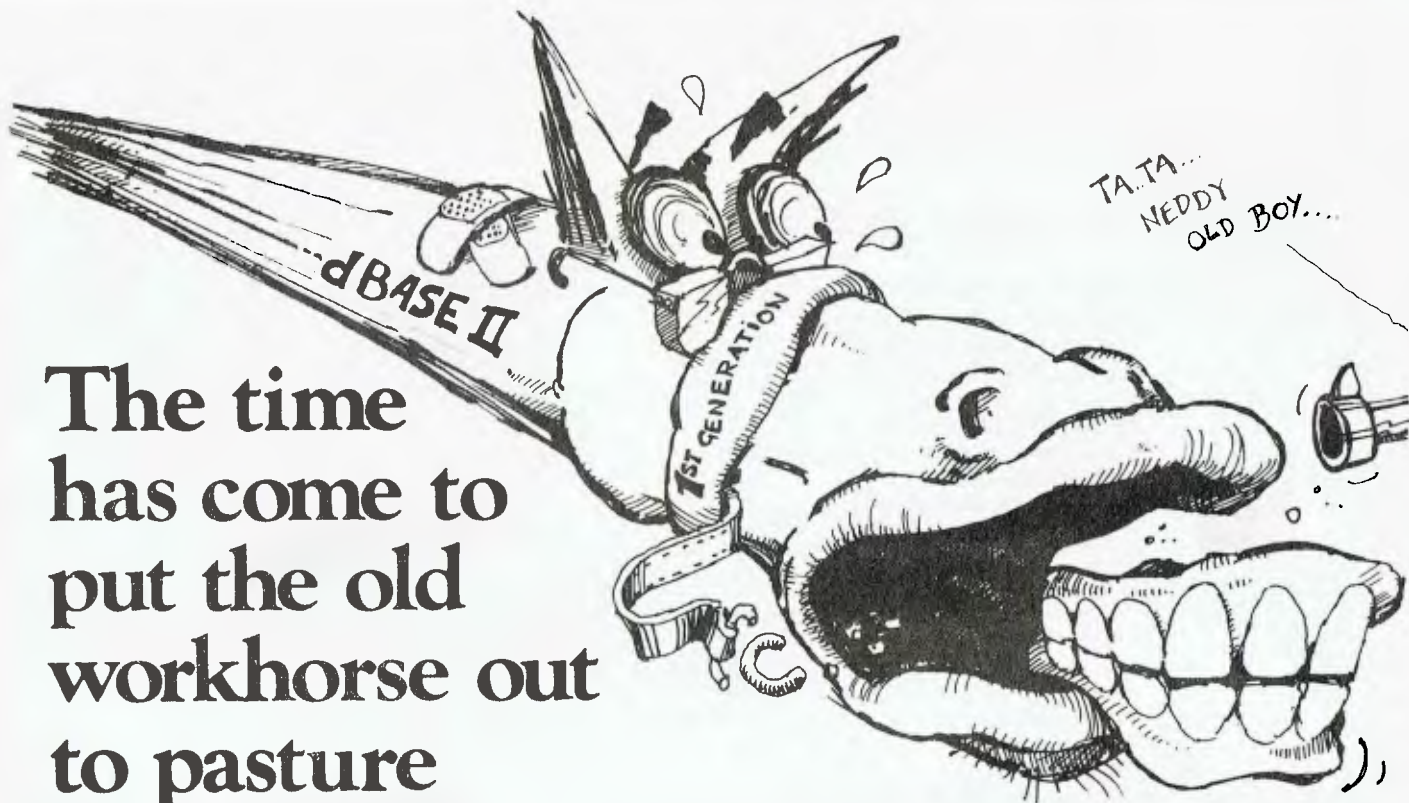


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Tim Lamberton, M Sc.
software consultant to
Occidental Life.

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Delta and Dataflex are available at leading computer stores everywhere. Ring up your local dealer and ask him for a demo. If he doesn't know about the product you're interested in, ring us. Or better yet, have your dealer ring us. It's time he got on the inside track.

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only it's green) at \$349 or high-resolution colour at \$1149. For colour use, a colour graphics board is necessary, at \$349, plus a hi-res graphics board (\$699).

We reviewed the standard Model 2000, which includes two 720K disk drives, keyboard, MS-DOS, BASIC and 128 Kbytes of memory. We also had the hi-res graphics card and colour monitor, together with dBase II and MultiPlan. It arrived in a couple of boxes, and we simply unpacked it, plugged everything together and it ran first time — although we were a little perplexed by the fact that drive A: is the lower of the two drives, a reversal of the 'standard'. Perhaps we should have read the manual first!

We encountered no difficulties or problems with the machine apart from the odd disk error which more than likely was due to the particular disks we were using. There are a few things that could be improved on the machine: for example, although the colour monitor has excellent resolution and colour saturation, it also has a highly reflective screen surface which can be quite distracting. We were also surprised at how slowly BASIC programs scrolled when listed to the colour screen.

The operating system is MS-DOS 2.0, and there are no surprises here; it works just like MS-DOS does on any other machine. It is supplied with the usual series of utilities. Perhaps of more interest is the software support from other suppliers.

Range of Software

Tandy has a range of software available for this machine that stands up well. For word processing, for example, there's pfs:Write (\$179.95 (all prices include sales tax)), Microsoft Word (\$499.95) and MultiMate (\$349.95). For simple electronic filing, you can have pfs:File (\$179.95) and pfs:Report (\$149.95), while for serious database work, dBase II is available (\$699). The standard spreadsheet is MultiPlan (\$349.95).

The Microsoft range of languages is available, together with Ryan-McFarland COBOL. For private use, there's The Home Accountant Plus, Planetfall and The Witness.

A fair selection of IBM PC software will run, generally those programs

which have simple screen handling. More complex programs which do direct screen accessing simply won't work. However, the majority of accounting packages and similar commercial software don't suffer from this problem.

The Model 2000 will automatically sense the disk format and will automatically read and write IBM PC-DOS or MS-DOS standard disks (which is, of course, how we were able to try Microsoft C on the machine).

The high-resolution graphics board provides a monochrome display with a resolution of up to 640 by 400, and with the addition of a colour graphics board it is possible to display a palette of up to eight colours simultaneously from a total of fifteen. The version of Microsoft's GW BASIC supplied has additional commands to allow complete control of the graphics (such as a PALETTE USING statement which allows the colour palette to be quickly loaded from an array).

A graphics dump program is supplied which allows the screen to be dumped from a BASIC program to the CGP-220 colour ink-jet printer. (This printer, by the way, is the same as the Canon one which I raved about a few months ago).

Another peripheral that's available is the DigiMouse/Clock board, which presumably will be needed when the Microsoft Windows package becomes available.

Summing Up

The TRS-80 Model 2000 is a very high-performance machine indeed, for those who are not totally concerned about IBM compatibility in the graphics area. Its benchmark performance shows it to be the fastest machine we have tested to date. This speed improvement is most obvious on in-memory processes, such as large spreadsheet calculations, number-crunching and other computer-bound processes. In typical commercial disk-oriented applications, the difference is less evident, and a hard disk would be well worth while.

Once again, the Model 2000 is easily the best thing Tandy has ever done; it should find enthusiastic support in the local marketplace. □

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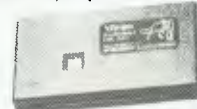
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****Dealer enquiries welcome****

For many years Morrow Designs had a very low profile, being known only to the cognoscenti in the computer community as producers of high-quality products. Here Les Bell reports on the latest machine from a company fast becoming famous for value for money.

dBest Machine for dJob

BACK IN 1977, the Morrow CPU/Front Panel was the state of the art. I'd just arrived in Australia, found myself without a personal computer and starting building one around the Morrow CPU, and it was then that I realised just what kind of designer George Morrow is. Through clever use of bipolar ROMs, open-collector logic and other technical trickery, George was able to get more performance out of less hardware than anybody else.

That became the hallmark of George's company: to get more performance for the dollar through good, clever design – without sacrificing quality at all. Over the years, I've had Morrow memory, disk controllers and other hardware in my computers, and all have performed flawlessly.

Back in those early days, George's company was called Thinker Toys – a clever name but one that didn't convey the right image of quality. After the change to Morrow Designs came the first complete computer from the company: the Decision One, a small multi-user system that runs a copy of UNIX called Micronix (and very nice it is, too).

More recently, the company has continued to apply cost-cutting design principles to a line of personal computers called the Micro Decision. The original Micro Decision was reviewed in these pages some time ago, but the latest model represents quite a leap forward and is worth further examination.

The Micro Decision MD-11 is a single-user machine based on an eight-bit Z-80A processor, and running the CP/M operating system. It is supplied with a range of bundled software for word processing, spread-

sheet budgeting and database management, together with a couple of BASIC interpreters.

So what? I hear you say – and well you might. Adam Osborne was doing that kind of thing three years ago; there's nothing new about low-cost eight-bit systems with bundled software. But my description above doesn't tell the whole story.

The MD-11 has two disk drives: one floppy with 400 Kbytes capacity and an 11 Mbyte hard disk. It has 128 Kbytes of memory internally, rather than the more usual 64K, and it puts it to good use by running the CP/M Plus (aka CP/M 3.0) operating system. The bundled software includes NewWord (a CloneStar), SuperCalc, Microsoft BASIC, BAZIC, Perfect Pearl, and a number of very sophisticated utilities – including a special PILOT interpreter. All of this sells for under \$5000 – including terminal and printer – admittedly plus sales tax.

All this adds up to a machine that represents the sophisticated, high-performance, low-cost end of the eight-bit market – the kind of machine that makes the performance of most 16-

The MD-11 has very versatile display possibilities; here it is running a break-even analysis.



bitters look a bit sick, as you'll see, and leaves them for dead on a value-for-money comparison. When I editorialised a couple of months ago about eight bits not being dead, this was the kind of machine I had in mind.

A Small Box

The MD-11 is a small box, not much bigger than a pair of disk drives, which attaches to an external terminal. Virtually any kind of external terminal will do, but Morrow produces its own terminal which works particularly well with the machine and would be a good choice.

Most of the front panel of the machine is a cut-out for the disk drives. At the left is a half-height 13 cm disk drive with a blank panel above it, while in the centre of the machine (right side of the cut-out) is an 11 Mbyte (formatted, 12.7 Mbyte unformatted) 13 cm hard disk. At the right side of the machine is a name badge, and recessed under the lower edge is the reset button and the power light.

At the rear of the machine is the power switch and the power cable's IEC connector, together with three serial ports. Two of these are regular RS-232C ports, one intended for the printer and one for a modem or other communications, but the third can also be used as an RS-422 port, for use with Morrow's local area network, which was first demonstrated at Comdex last year. It could also be used for HDLC, SDLC and bisync communications to remote mainframes, and software for this is expected before long.

Inside the box – under that plain vanilla cover – lurks a Z-80A processor running at 4 MHz, which is not fast,

but certainly adequate. More importantly, there's 128 Kbytes of RAM, which contribute to the machine's speed in another way. There's also a bootstrap ROM which has been intelligently written. The ROM contains diagnostic routines which run at power-on (though not on reset: by then we know the memory's OK and don't want to be kept waiting), as well as a smart bootstrap: if there's a floppy in the drive, it will offer to boot from there, otherwise it normally proceeds to boot from the hard disk.

The cunning design of the disk controller circuitry contributes to the low cost of the machine, in the best Morrow traditions. Unlike most machines, which have separate disk controllers for the floppy and hard disks, this one uses one disk controller chip and associated components, but has two data separator circuits, which it switches between under software control. Cunning! The circuit will support up to two floppy disks and two hard disks.

Distinguished Software

It is in the software area that the MD-11 further distinguishes itself. Firstly, the operating system is not the CP/M 2.2 that we've all come to know and love; instead it's CP/M Plus, which is a considerable improvement over its illustrious antecedent.

Of most interest to the non-technical user is the fact that the system no longer requires you to type control-C whenever disks are changed. Instead, the system automatically senses media changes and takes the appropriate action. Secondly, cryptic error messages like 'BDOS Err on B:Bad Sector' have been banished in favour of more helpful messages and the option of aborting the operation, retrying it, or ignoring the error and proceeding. Actually, Morrow has also provided this facility on its CP/M 2.2 implementations, but CP/M Plus handles this a lot better.

Next CP/M Plus shares some features with MP/M and Concurrent CP/M: like password protection on disks and files, and date and time stamping of files. With a hard disk system, security becomes a problem, since you can't simply remove the disk and lock it in a drawer, as you can with floppies. The password protection is therefore a particularly useful feature. Use it with care, however, or you'll do what we did: put password protection on almost



The complete Morrow MD-11, including Morrow's own terminal, which is part of the \$5000 package.

every file on the system and then forget the passwords the next day, forcing us to restore the disk from back-ups!

The date and time stamping feature allows the system to automatically record any two of the date and time at which a file was created, or at which it was last updated, or at which it was last accessed. This can be particularly handy with hard disk systems; if you know a file hasn't been updated since before the last back-up, you don't need to make another back-up.

Less obvious unless you look for it is the command line editing feature. After typing a command line, you can recall it and edit it, and then re-transmit it to the operating system. The command line editor uses control keys similar to WordStar's, and is incredibly useful if, like me, you often have to type lines like:

```
LINK B:STUDENTS, AM80PLI.IRL[S,
A,Q], AM80BUF.IRL, SCREENS.IRL[S].
```

Your chances of getting lines like that right first time aren't too good!

Possibly of more significance to commercial users is the speed of the system. One of the most significant features of CP/M Plus – compared to CP/M 2.2 – is that it does not sequentially search through the disk directory to find a file. Instead, it computes, using a technique called hashing, the position where the directory entry ought to be, and starts searching there. Since a typical hard disk can have 1024 or more directory entries, this provides a tremendous speed improvement when frequently opening files.

A second, equally important technique used by CP/M Plus is track and sector buffering, and this is where the 128 Kbytes of memory comes in. Instead of using a 1 Kbyte or smaller disk buffer, as most systems do, to act as a 'window' through which files are passed in small chunks, CP/M Plus makes use of its secondary banks of memory to build large disk buffers.

This is particularly important for files which are accessed randomly, like databases, and becomes extremely significant where multiple files are open for random access at one time, as in the case of dBase II. On the average, according to a benchmark I saw in a US publication, CP/M Plus provides a seven-times speed improvement in access to indexed files, such as are used by dBase II and similar database systems.

Benchmarking

Now the MD-11 already has a hard disk, which is quite quick, and with the CP/M Plus operating system it ought to be even quicker. So we conducted some benchmarks, using Microsoft BASIC and dBase II. The results are shown in Table 1.

The Sieve benchmark is the standard Sieve of Eratosthenes prime number generation benchmark as described in *Byte* and elsewhere. This reveals nothing startling: for processor-bound tasks, the MD-11 is a fairly standard 4 MHz Z-80 machine. The BM9 benchmark (another prime number generator) similarly reveals nothing new.

The Disk Test benchmark, however, comes in at 11.66 seconds, revealing ▶



The MD-11 running NewWord, a powerful WordStar near-clone.

the speed of the hard disk. We suspected it should be fairly quick: performing a large and complex PL/I compilation, the MD-11 was three times faster than a floppy-based system.

The dBase II BMARK benchmark comprises three stages. Stage 1 simply writes out a file consisting of 1000 records, with the key value generated by a simple pseudo-random number generator. Stage 2 indexes that file, while stage 3 does a find and delete on 12 records, followed by a pack of the file.

The results are interesting, to say the least, particularly compared with the Tandy TRS-80 Model 2000, which we were reviewing at the same time and which represents the state of the art in high-performance processors. The MD-11 was slower than the Model 2000 in stage 1, primarily because that stage involves a significant amount of processor activity in generating the pseudo-random numbers.

However, in stages 2 and 3, the MD-11 was almost five times faster, largely due to the buffering provided by the CP/M Plus operating system, but also thanks to the hard disk. Overall, the MD-11 was almost three times faster (~200s v ~600s). The Tandy will win hands down every time where processor-intensive tasks are involved, but in running dBase II and similar applications which are disk-intensive, the MD-11 will do better.

Notice also that the performance

barely degrades when the BMARK benchmark is run on the floppy disk. This brings home the point that the performance is largely due to the operating system, optimisation of buffering and the disk controller circuitry rather than the rotational speed of the hard disk.

For some time I've been lecturing at seminars on dBase II about the impact that the hardware and the operating system can have on dBase performance, and when the MD-11 first appeared I suggested it might be the best combination of hardware and software to run dBase II. These figures confirm this view. If I were buying a machine to run dBase II, this would be the one — no doubt about it.

Powerful Packages

The MD-11 doesn't have dBase II as standard, however. Instead, it comes with a database system called Personal Pearl, which I have only played with briefly, but which seems to have a lot of potential. Rather than requiring the user to write programs, Personal Pearl works through the creation of screens and reports. It seems to be quite powerful, though of a completely different style to dBase II, with which I am more familiar.

The word processor supplied with the MD-11 is NewWord, from NewStar software. This package looks for all the world like WordStar, but with a few significant differences. NewStar is in fact a group of former MicroPro employees who wanted to produce an enhanced version of WordStar — and that's what NewWord is.

On starting up NewWord, it signs on with a main menu very similar to WordStar's. The only difference is

that the Mailmerge option isn't there, because NewWord automatically mailmerges if required. Once editing a document, again, the screen is very like WordStar, but with a few important differences. Perhaps most important to the majority of users is the Undelete key.

One of the most common criticisms of WordStar is that the delete word key, ↑T, is right next to the delete line key, ↑Y, and it is very easy to accidentally hit the wrong one. And with WordStar, once some text has been deleted, that's it — it's gone forever. The user is faced with the agonising choice of trying to rewrite the missing text or abandoning all the work he/she has done in that edit session. Has it happened to you? Yeah, I thought so!

With NewWord, every piece of text bigger than a single character that is deleted is placed into a buffer. The buffer normally defaults to a size of 100 characters, but the user can change it if required. The ↑U key, as well as acting as the interrupt key, also will recall the last piece of text deleted, from that buffer. So if you accidentally hit ↑Y instead of ↑T, just hit ↑U and the deleted text will magically reappear!

There are a number of other changes in NewWord. For example, you can now position the cursor to any page number, so if you are used to working with page-oriented systems, this facility will be very handy. Best of all are the print enhancements: at the end of the questions which the system asks the user about printing, there's the usual WordStar question about pausing between pages, then NewWord goes on to ask which printer you want to print on. The program has a wide range of printer

Table 1. Benchmarks.

Machine	Benchmark	Language	Stage 1	Stage 2	Stage 3	Total Time
2 MHz 8080	BMARK	dBase II	247.66	287.48	347.61	882.75
Morrow MD-11	BM9	BASIC (MBASIC)				706.79
Morrow MD-11	Disk Test	BASIC (MBASIC)				11.66
Morrow MD-11	Sieve	BASIC (MBASIC)				1723.70
Morrow MD-11 (floppy disk)	BMARK	dBase II	110.00	65.60	85.30	260.90
Morrow MD-11 (hard disk)	BMARK	dBase II	107.50	52.00	60.80	220.30
TRS-80 Model 2000	BMARK	dBase II	80.92	237.69	285.89	604.50

SPECIFICATIONS AND REPORT CARD

Unit:	Morrow Designs Micro Decision MD-11
Made by:	Morrow Designs
Distributed by:	Automation Statham (Sydney) — (02) 709-4144; Archives (Melbourne) — (03) 699-8377; Microtrix (Melbourne) — (03) 439-5155
Processor:	Z-80A
Clock speed:	4 MHz
RAM:	128 Kbytes
ROM:	8 Kbytes, containing bootstrap and memory test
I/O:	Three serial ports, RS-232C and RS-422
Languages:	MBASIC, BaZic standard, plus other CP/M languages
Keyboard:	Full QWERTY
Display:	80 by 24, green
Graphics:	Line drawing set
Peripherals:	Printer, modem, etc.
Expansion:	Additional floppy, hard disk
Best points:	Excellent speed, superb value for money
Worst points:	It's a pity it wasn't available three years ago!

Ratings:	Excellent	Very Good	Good	Poor
Documentation:			•	
Ease of use:		•		
Functionality:	•			
Support:		•		
Value for money:	•			
Price:	\$5499 incl. tax with terminal; \$4410 incl. tax for computer alone			
Review unit from:	Automation Statham Pty Ltd, 47 Birch St, Bankstown 2200. (02) 709-4144			

drivers which are installable as it runs, so you can set up the system to default print on your daisywheel printer, but if you specify 'draft' have NewWord send its output to a dot matrix printer.

A few of WordStar's features are missing: for example, the ability to set and find place markers (for example, ↑K1, ↑Q1) which I use a lot when editing programs — but then, most people will never miss that feature. Also, the help facility works slightly differently; but overall most WordStar users will experience very little pain and should find the changeover worthwhile.

The MD-11's spreadsheet is Supercalc, which is one of the standards of the industry. The spelling checker is Correct-It, which has a 36,000-word dictionary. Both of these programs are fairly straightforward, and offer performance that is about standard for the eight-bit world.

The MD-11, since it incorporates a hard disk, raises the problem of back-up. This is handled very adroitly by a Morrow-supplied utility called Backfield. Backfield calculates a checksum for every directory entry and compares that checksum with a value stored in a file from the last time it was run. If the values are different, then the file has been updated and should therefore be backed up — which Backfield proceeds to do.

Morrow Terminal

The MD-11 is normally supplied with a Morrow terminal, and there would seem to be little point in using any other terminal for a couple of reasons. Firstly, the MD-11 has an installation program which runs automatically on power-up and copies all the software onto the hard disk and then installs it for the appropriate terminal, and this works best for the Morrow terminal. Secondly, the Morrow screen has a number of unique features which work well with the MD-11.

For example, the keys on the terminal all generate unique codes — including for combinations of shift and control keys — and these are interpreted by the BIOS (Basic Input/Output System) in the MD-11. A utility called KEY allows the user to amend the

key translation table in the BIOS, thus effectively reprogramming the keys. This means that programs like NewWord, SuperCalc and Personal Pearl can make use of the cursor arrow keys, the HELP key and other special keys regardless of what codes they actually generate.

The terminal has a crisp green display which is quite easy on the eyes. The keyboard is slightly higher in profile than is fashionable these days, but is quite comprehensive and comfortable to use. There are twelve function keys across the top row of the keyboard, and with the MD-11 these can, in effect, be reprogrammed. The KEY.COM utility reads in a standard ASCII text file — possibly created with NewWord — and changes the translate table, then automatically chains to the appropriate applications program.

Finally, the MD-11 is supplied with an interpreter for the educational language PILOT (Programmed Inquiry, Learning Or Teaching). While this is of limited interest to the majority of users, it is quite important for computer novices since a set of PILOT programs is provided which replaces the CP/M command line with a set of menus, thus relieving the user of the job of learning all about the CP/M commands.

Perhaps the major benefit of this is when the system is first being installed. A PILOT program automatically takes care of formatting and verifying the hard disk, copying the various files off floppies and finally performing the installation for the user's terminal. The whole process requires virtually no operator intervention.

The other two languages supplied with the MD-11 are Microsoft BASIC — the industry standard, to coin a phrase — and BAZIC by Micro Mike's, which is a version of North Star BASIC and has some interesting features for commercial programming.

Summing up, then, the MD-11 is a good, solid commercial machine which offers extremely high performance in disk-bound applications such as running dBase II applications. It is extremely sophisticated in operation, civilised in its error handling, and offers access to a wide range of thoroughly debugged and well-tried software. At its price of \$4410 including tax, or \$5499 for the system complete with terminal, it represents a) high performance and b) excellent value for money. In fact, I venture to suggest that for a small business machine, this must be the best value for money and the highest performance on the market today.

FRAMEWORK

Framework® is the first of a new generation of products that goes beyond today's integrated spreadsheets. It is an order of magnitude better than the original integrated products and windows.

The heart of Framework is a unique "frames" technology. Frames are actually self-contained, inter-related displays that can be nested, resized and relocated anywhere on the screen. Frames bring new flexibility to the way information is created and managed with a PC. With this truly three-dimensional design, the user can create infinite logical hierarchies of information, leading to as deep a level of complexity as needed for the task at hand. There is no limit to the number of frames that are active in the system. Framework's user interface is one of the most elegant designs yet conceived.

Word Processing

Framework's word processor is dynamite! It gives users the choice of frame or fullscreen viewing of documents, multiple margins within a single file, automatic justification and repagination, header/footers, page numbers and more. The streamlined menu system helps new users get started in a hurry and "shorthand" commands help veterans work even faster.

Outlining

The innovative and very powerful outline processor can be used as a standalone organizer or as a companion to the word processor. Using this outline mode, single ideas can be quickly captured and then expanded into fuller concepts and solutions. Any outline-frame or subheading within an outline can be instantly expanded to include text, spreadsheets, graphs or databases. Finally, with Framework, your PC is truly a thinking machine.

Database

Framework's database system can be learned quickly and put through its paces effortlessly because most commands are common throughout the entire program. Framework itself will handle most of your analytical information management needs, and if very large data handling is required, Framework is fully compatible with dBASE II®.

Spreadsheet

Spreadsheets are simple to create, use traditional row/column or English-language cell addresses, can be linked to automatically update other files based on cell data and have an exclusive international numerics feature that will change entries to accurately reflect changes in currency denominations including the placement of commas and decimal points.

Graphics

The graphics portion of Framework has been designed to produce exceptional charts and graphs on standard monochrome monitors. Six of the most frequently used business graphs are built-in and can be automatically drawn and updated from data in spreadsheets and database files.

DOS Access

The new DOS access capability allows any user to actually run other PC DOS software inside Framework. This allows users to gather data from other programs without quitting Framework. It will be of great help to people who frequently shuttle between programs and to businesses who perform frequent interchange of programs or data with larger systems.

Custom Applications

Framework comes complete with its own programming language. Users can begin writing their own custom packages or use software developers right away. In addition, dealers will continue to receive the excellent support that

has helped make Ashton-Tate the front-runner in the software industry with dBASE II and FRIDAY!

Hardware

Framework will run on the IBM PC, PC XT and all compatibles. It requires just 256K RAM and dual 360Kb floppy disk drives with monochrome display.

Availability

Framework will be available in Australia from the end of July. Contact your dealer end-June for more details or write to the Master Distributor, ARCOM Pacific, Freepost 2 (no stamp required), P.O. Box 13, Clayfield, Qld. 4011.



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POCKET PROGRAMS

```

001300 DATA 23,0,247,228,242,0,8,255,119,35,16,252,19,240,247,35,0,246,1,14,0,137,126,121
00140 DATA 42,10,246,221,23,13,246,253,33,13,246,32,8,253,119,0,68,258,205,14,128,253,
128,0,0,0,0,205,27,128,255,126,0,253,52,0,221,190,0,32,225,201,35,119,205,18,128,35,1
00150 DATA 205,42,128,253,33,15,246,253,54,0,33,33,64,240,14,4,62,32,6,255,119,35,16,1
7,64,240,6,6,33,1,246,205,18,128,254,1,32,249,205,18,128,18,190,32,108,35,17,16,245,1
00160 DATA 205,18,128,205,18,128,205,18,128,254,5,32,83,119,205,18,128,35,119,205,18,
18,128,254,5,32,65,35,119,205,18,128,35,119,1,255,255,201,1,0,0,201,205,18,128,18,19,1
00170 DATA 19,19,42,8,246,221,33,11,246,14,0,12,205,18,128,254,255,32,249,205,18,128,
253,126,0,237,68,253,119,0,18,205,18,128,119,35,16,249,1,255,255,201,1,0,0,201,205,18,128,
00180 DATA 205,18,128,119,35,121,221,190,0,32,216,1,255,255,201,1,0,0,201,205,18,128,
5,18,128,254,77,32,9,33,58,0,25,84,93,195,105,117,27,27,27,27,27,24,245
00190 DATA 205,42,128,253,33,15,246,253,54,0,33,33,64,240,62,32,14,4,6,255,119,35,16,
7,64,240,6,6,33,1,246,205,18,128,254,1,32,249,205,18,128,18,119,19,35
00200 DATA 16,247,205,18,128,254,77,32,228,205,18,128,254,67,32,218,195,134,116
00210 DATA 205,42,128,253,33,15,246,253,54,0,33,33,64,240,14,4,62,32,6,255,119,35,16,
7,64,240,6,6,33,1,246,205,18,128,254,1,32,249,205,18,128,18,190,32,102,35,19,16,245
00220 DATA 205,18,128,205,18,128,205,18,128,254,5,32,77,119,205,18,128,35,119,205,18,
18,128,254,5,32,59,35,119,205,18,128,35,119
00230 DATA 19,19,221,33,11,246,14,0,12,205,18,128,254,255,32,249,205,18,128,185,32,30
0,237,68,253,119,0,18,205,18,128,35,16,250
00240 DATA 205,18,128,121,221,190,0,32,216,1,255,255,201,1,0,0,201,205,18,128,18,19,1
8,254,77,32,9,33,58,0,25,84,93,195,101,117,27,27,27,27,27,24,245
00250 DATA 205,42,128,253,33,15,246,253,54,0,33,33,64,240,62,32,14,4,6,255,119,35,16,
7,64,240,6,6,33,1,246,205,18,128,254,1,32,249,205,18,128,18,119,19,35
00260 DATA 16,247,205,18,128,254,77,32,225,205,18,128,254,67,32,218,195,130,117
00270 RESTORE:FOR A=29496 TO 30268:READ B:POKE A,B:NEXT A
00280 CLS:PLAY 70:UNDERLINE:CURS 23,1:PRINT"MACHINE CODE SAVER":NORMAL
00290 CURS 20,3:PRINT"SAVE"TAB(25)"1"
00300 CURS 20,5:PRINT"LOAD"TAB(25)"2"
00310 CURS 20,7:PRINT"VERIFY"TAB(25)"3"
00320 A0$=KEY$:IF A0$="" THEN 320
00330 IF A0$="1" THEN 370
00340 IF A0$="2" THEN 540
00350 IF A0$="3" THEN 440
00360 GOTO 320
00370 CLS:CURS 28,1:PRINT"<<SAVE>>":PLAY 20:POKE 233,4
00380 CURS 1,2:PRINT":INPUT ADDRESS START:"A1$:A0=VAL(A1$):IF FRAC(A0)=0 THEN LET A=INT(A0)
CURS 1,2:PRINT[A64 32]:PLAY 23:GOTO 380

```


Apple II

Hi-Res Page Peeker

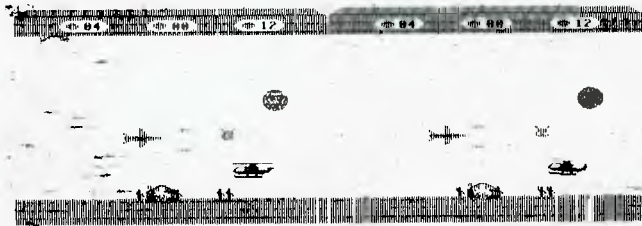
Tony Humfrey, Parkes, NSW

This short routine enables the user to view what has been drawn on a hi-res game. This is useful if you want to get a printed picture of the hi-res screen reproduced on the printer, but don't know which hi-res screen (1 or 2) it is on.

The program requires the user to first load the hi-res picture - if it is a game, insert a normal disk that doesn't have a hi-res drawing straight off (e.g. the System Master Diskette) and press reset. If this doesn't reboot the disk try Ctrl - open apple - reset (only on the //e). Then run this program. The program starts off with the dump of screen 1 and flips to screen 2

when a key is pressed. They then toggle on and off between the two every time a key is pressed. (See printed graphics dump on CHOPLIFTERS! included with program listing).

```
10 HOME
20 POKE -16304,0: POKE -16297,0
30 POKE -16300,0
40 GET A$:R = PEEK (-16336)
60 POKE -16299,0
70 GET A$:R = PEEK (-16336)
90 GOTO 30
100 HCOLOR=3
110 V=279:Y=191:A=0:B=0
120 HPL0T A,B TO A,Y TO X,Y TO X,B
124 POKE 230,32: POKE -16300,0
125 X=X+1:Y=Y-1:A=A+1:
    B=B+1
126 IF A > 279 THEN A=279
127 IF B < 191 THEN B=191
128 IF X < 0 THEN X=0
129 IF Y > 0 THEN Y=0
130 GOTO 170
```



The Game

Tony Humfrey, Parkes, NSW

Alright, so the title's not imaginative. But don't let that fool you. 'The Game' is hard. The play is familiar. You control a ship at the bottom of the screen which can move left or right. Above you, the competition computer companies loom. Only one of them is on the screen at any time. You (being the faithful Apple supporter you are) must shoot down such names as IBM, PET, and the VIC.

At the beginning, you are offered the choice of either steerable bullets or normal missiles. Steerable missiles allow you to control the path they take, but are considerably more dangerous to use as you have to be under the enemy and thus open to attack to hit them. Normal missiles are less accurate, but safer.

The game was written for a joystick (or paddle - PDL (1) moves you either button fires).

The program could possibly be sped up in a number of ways. I will not tell you how, because figuring it out is half the fun (anyway, I'm too lazy to bother trying).

LIST

```
1 REM
2 REM
3 REM THE GAME
4 REM
5 REM BY Tony.Humfrey
6 REM
7 REM
10 INVERSE
20 HOME:PRINT TAB(161)"THE G
    A ME "
30 NORMAL
40 PRINT:PRINT " THE OBJECT
    OF 'THE GAME' IS TO SHOOT DO
    WN ALL OF THE OPPOSITION COM
    PUTER COMPANIES"
50 PRINT " IF THE ENEMY SHOTS
    YOU IN THE CENTRE, YOU ARE D
    EAD. YOU GET THREE LIVES AND
    AN EXTRA LIFE AFTER EVERY SEC
    OND WAVE OF THE ENEMY."
```

```
60 PRINT:PRINT:PRINT " THE
    SCORING IS AS FOLLOWS:";PRINT
    :PRINT " 10 POINTS PE
    R SHIP IN LEVEL 1";PRINT:
    PRINT "(INCREASING FROM 1 TO
    10 POINTS PER LEVE
    L THEREAFTER)"
70 PRINT:PRINT "STEERABLE MISS
    ILES(Y/N)";GET S$:PRINT
80 VTAB 23:INVERSE:PRINT "HIT
    ANY KEY TO CONTINUE";GET
    R$
90 NORMAL:W=INT(RND(1)*
    10)+1
100 LEVEL=1:MEN=3:ENEMY=10
110 HIT=10
120 ENEMY$="<1>:SHOT=INT(H
    IT/3)
130 HBADY=INT(RND(1)*37)+
    2
140 BADVY=INT(RND(1)*17)+
    2
150 MV=INT(RND(1)*3)-1
160 HM=INT(RND(1)*3)-1
170 HOME
180 VTAB 23:HTAB 20:PRINT "LEV
    EL 1:LEVEL";SHIPS:;MEN
190 H=20
200 REN I GAME START 1
210 NORMAL:W=INT(RND(1)*
    10)+1
220 IF W=1 THEN YOU$="IBM"
230 IF W=2 THEN YOU$="VIC"
240 IF W=3 THEN YOU$="PET"
250 IF W=4 THEN YOU$="1"
260 IF W=5 THEN YOU$="1"
270 IF W=6 THEN YOU$="1"
280 IF W=7 THEN YOU$="1"
290 IF W=8 THEN YOU$="1"
300 IF W=9 THEN YOU$="1"
310 IF W=10 THEN YOU$="1"
320 VTAB 22:PRINT
330 VTAB 22:HTAB 2:PRINT YOU$
340 VTAB 22:PRINT
350 MV=INT(RND(1)*5)+1
360 R=INT(RND(1)*8)+1:IF
    R=8 THEN GOSUB 1450
370 HM=INT(RND(1)*5)+1
380 VTAB 22:PRINT "ENEMY:;ENE
    MY$
390 IF PDL(0)>150 AND PDL(
    0)<240 THEN H=H+1:FOR
    W=1 TO 10:PEEK(-163
    36):NEXT W
400 IF PDL(0)<100 AND PDL(
    0)>10 THEN H=H+1:FOR
    W=1 TO 10:PEEK(-163
    36):NEXT W
410 IF PDL(0)>240 THEN H=H
    +2:FOR W=1 TO 20:A=PEEK
    (-16336):NEXT W
420 IF PDL(0)<10 THEN H=H
    +2:FOR W=1 TO 20:A=PEEK
    (-16336):NEXT W
430 IF H<1 THEN H=1
440 IF H>24 THEN H=24
450 IF BADVY>20 THEN BADVY=2
    0
460 VTAB BADVY:HTAB HBADY:PRINT
    ENEMY$
470 IF PEEK(-16287)>127 OR
    PEEK(-16236)>127 AND F
    LAG=0 THEN 630
480 FLAG=0
490 VTAB BADVY:HTAB HBADY:PRINT
    "
500 IF MV=1 THEN BADVY=BADVY
    +2
510 IF MV=2 THEN BADVY=BADVY
    +1
520 IF MV=4 THEN BADVY=BADVY
    +1
530 IF MV=5 THEN BADVY=BADVY
    +2
540 IF HM=4 THEN HBADY=HBADY
    +1
550 IF HM=5 THEN HBADY=HBADY
    +2
560 IF HM=1 THEN HBADY=HBADY
    -2
570 IF HM=2 THEN HBADY=HBADY
    -1
580 IF BADVY<1 THEN BADVY=1
590 IF HBADY>2 THEN HBADY=3
600 IF HBADY>37 THEN HBADY=3
    7
610 IF BADVY>20 THEN BADVY=2
    0
620 GOTO 330
630 G=H
640 FOR F=21 TO 1 STEP -1
650 IF G<0 THEN G=0
660 VTAB F:HTAB 5+3:PRINT "
670 FOR W=1 TO 20:A=PEEK(
    -16336):NEXT W
680 VTAB F+1:HTAB 6+1:PRINT
    "
690 MV=INT(RND(1)*5)+1
700 HM=INT(RND(1)*5)+1
710 VTAB BADVY:HTAB HBADY:PRINT
    ENEMY$
720 IF PDL(0)>150 AND PDL(
    0)<240 THEN H=H+1
730 IF PDL(0)<100 AND PDL(
    0)>10 THEN H=H+1
740 IF PDL(0)>240 THEN H=H
    +2
750 IF PDL(0)<10 THEN H=H
    +2
760 IF S$="Y" THEN G=H
770 IF BADVY<1 THEN H=1380
780 IF H<1 THEN H=1
790 IF H>36 THEN H=36
800 VTAB 22:PRINT
910 VTAB 22:HTAB 2:PRINT YOU$
920 VTAB 22:PRINT
930 VTAB BADVY:HTAB HBADY:PRINT
    "
940 IF MV=2 THEN BADVY=BADVY
    +1
950 IF MV=1 THEN BADVY=BADVY
    -1
960 IF MV=4 THEN BADVY=BADVY
    +1
970 IF MV=5 THEN BADVY=BADVY
    +2
980 IF HM=4 THEN HBADY=HBADY
    +1
990 IF HM=5 THEN HBADY=HBADY
    +2
1000 IF HM=1 THEN HBADY=HBADY
    -1
1010 IF HM=2 THEN HBADY=HBADY
    -2
1020 IF BADVY<1 THEN BADVY=1
1030 IF HBADY>3 THEN HBADY=3
1040 IF HBADY>37 THEN HBADY=3
    7
1050 R=INT(RND(1)*8)+1:IF
    R=8 THEN GOSUB 1450
1060 IF BADVY>20 THEN BADVY=2
    0
1070 IF F=BADVY AND H+4=NBA
    DY THEN 1020
1080 IF F=BADVY AND H+5=NBA
    DY THEN 1020
1090 IF F=BADVY AND H+6=NBA
    DY THEN 1020
1100 NEXT F
1110 VTAB 1:PRINT "
1120 REM (EXPLANATION)
1130 FOR I=1 TO 5
1140 INVERSE
1150 FOR D=F-1 TO F+1
1160 IF D<1 THEN D=1
1170 IF D>1 THEN D=1
1180 VTAB D:HTAB G-1:PRINT "
1190 NEXT D
1200 NORMAL
1210 FOR D=F-1 TO F+1
1220 IF D<1 THEN D=1
1230 IF D>1 THEN D=1
1240 VTAB D:HTAB G-1:PRINT "
1250 NEXT D
1260 FOR R=1 TO 100:A=PEEK
    (-16336):NEXT R
1270 ENEMY=ENEMY-1:SCORE=SC
    ORE+HIT:IF ENEMY=1 THEN 1
    300
1280 GOTO 130
1290 REM HOWDY
1300 HOME:VTAB 21:PRINT "SCOR
    E:SCORE:VTAB 17:PRINT "
    LEVEL:LEVEL:;
1310 VTAB 10:PRINT "SHIPS LEFT
    :MEN"
1320 FOR G=1 TO 100:NEXT G
1330 INVERSE:HOME:VTAB 17:PRINT
    "PRESS ANY KEY TO CONTINUE"
1340 GET A$:NORMAL:GOTO 124
    0
1350 HIT=HIT+INT(RND(1)*
    10)+1:SHOT=INT(HIT/3)
1360 LEVEL=LEVEL+1:ENEMY=
    LEVEL*10:INT(RND(1)
    ) * 10 + 1
1370 IF LEVEL/2=INT(LEVEL/
    2) THEN MEN=MEN+1
1380 IF G=1 THEN SHIP$="IBM"
1390 IF G=2 THEN SHIP$="VIC"
1400 IF G=3 THEN SHIP$="PET"
1410 IF G=4 THEN SHIP$="DEC"
1420 IF G=5 THEN SHIP$="1"
1430 IF G=6 THEN SHIP$="1"
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5980 IF G=461 THEN SHIP$="1"
5990 IF G=462 THEN SHIP$="1"
6000 IF G=463 THEN SHIP$="1"
6010 IF G=464 THEN SHIP$="1"
6020 IF G=465 THEN SHIP$="1"
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6070 IF G=470 THEN SHIP$="1"
6080 IF G=471 THEN SHIP$="1"
6090 IF G=472 THEN SHIP$="1"
6100 IF G=473 THEN SHIP$="1"
6110 IF G=474 THEN SHIP$="1"
6120 IF G=475 THEN SHIP$="1"
6130 IF G=476 THEN SHIP$="1"
6140 IF G=477 THEN SHIP$="
```



```

1340 IF 0 = 0 THEN SHIP$ = "YES"
1350 IF 0 = 10 THEN SHIP$ = "ZAP"
1360 ENEMY$ = SHIP$
1370 GOTO 130
1380 GOTO 1420
1390 HOME : PRINT "SCORE : " SCORE
: PRINT : PRINT "LEVEL : " LEVEL
: PRINT : PRINT : PRINT "
GAME OVER, HENRY WANTS ANOTHER
ONE" : GET A1 : IF A1 = 1
THEN 10
1400 IF A$ = "N" THEN PRINT : PRINT
"CATALOG" : NEW
1410 GOTO 1390
1420 FOR I = 1 TO 40 : A = PEEK (
1433A) : INVERSE : UTAB 22
: PRINT " : " : NEXT I : NORMAL
1430 MEN = MEN - 1 : IF MEN = 0
THEN 1390
GOTO 130
1440 FOR A = 1 TO 22
1450 Z = HADY + 1
1460 Z = HADY + 1
1470 UTAB A : HTAB 7 : PRINT "
1480 NEXT A
1490 FOR A = 1 TO 22
1500 UTAB A : HTAB 7 : PRINT "
1510 NEXT A
1520 IF Z = 3 = H OR Z = 2 = H OR
Z = 4 = H THEN 1420
1530 RETURN

```

THE GAME

THE OBJECT OF 'THE GAME' IS TO SHOOT DOWN ALL OF THE OPPOSITION COMPUTER COMPANIES

IF THE ENEMY SHOOTS YOU IN THE CENTRE, YOU ARE DEAD. YOU GET THREE LIVES AND AN EXTRA LIFE AFTER EVERY SECOND WAVE OF THE ENEMY.

THE SCORING IS AS FOLLOWS:
10 POINTS PER SHIP IN LEVEL 1
(INCREASING BY 1 TO 10 POINTS
PER LEVEL THEREAFTER)

STEERABLE MISSILES (M/N)
HIT ANY KEY TO CONTINUE LEVEL
1 : SHIPS : 3

ENEMY : 10

<1>

Wizard

This program will tell you the distances between any two planets in the solar system, and other information.

G. Shapley, Matraville, NSW

```

5 REM PLANETARY DISTANCES AND
OTHER INFORMATION
10 CLS
20 PRINT " PLANETARY DISTANCE AND"
30 PRINT " OTHER INFORMATION."
40 PRINT "
50 PRINT "
60 PRINT "
70 PRINT "
80 PRINT " I WILL TELL YOU THE "
90 PRINT "
100 PRINT "DISTANCE BETWEEN ANY "
110 PRINT "
120 PRINT "PLANET'S IN THE SOLAR"
125 PRINT "
130 PRINT "SYSTEM."
132 PRINT "
134 PRINT "DO YOU WANT IT PRINTED",
135 INPUT C$
140 PRINT "
150 PRINT "1ST PLANET",
160 INPUT A$
170 PRINT "
180 PRINT "2ND PLANET",
190 INPUT B$
200 CLS
210 IF A$ <> "SUN" THEN 240
220 D$ = "DIAMETER=139200 K.M."
230 A=0
240 IF A$ <> "MERCURY" THEN 270
250 D$ = "DIAMETER=4876 K.M."
260 A=57920*1000
270 IF A$ <> "VENUS" THEN 300
280 D$ = "DIAMETER=12070 K.M."
290 A=1000*108100

```

YEAR=88 DAYS"

YEAR=222.7 DAYS"

Planetary Distances & other information.

```

300 IF A$ <> "EARTH" THEN 330
310 D$ = "DIAMETER=12757 K.M."
320 A=149600*1000
330 IF A$ <> "MARS" THEN 360
340 D$ = "DIAMETER=6787 K.M."
350 A=228000*1000
360 IF A$ <> "JUPITOR" THEN 390
370 D$ = "DIAMETER=142749 K.M."
380 A=778340*1000
390 IF A$ <> "SATURN" THEN 420
400 D$ = "DIAMETER=119000 K.M."
410 A=1427*100000*10
420 IF A$ <> "URANUS" THEN 450
430 D$ = "DIAMETER=51000 K.M."
440 A=2870*100000*10
450 IF A$ <> "NEPTUNE" THEN 480
460 D$ = "DIAMETER=49500 K.M."
470 A=493*100000*10
480 IF A$ <> "PLUTO" THEN 510
490 D$ = "DIAMETER=UNKNOWN"
500 A=5890*100000*10
510 IF D$ = " " THEN 150
530 IF C$ = "Y" THEN GOSUB 560
535 PRINT " ", A$
540 PRINT D$
542 PRINT "
550 A$ = B$
551 IF X > 0 THEN 590
552 X = X + 1
554 B = A
555 GOTO 210
560 LPRINT "
565 LPRINT "
570 LPRINT "
575 RETURN
580 PRINT "THE DISTANCE BETWEEN THE "
585 PRINT "TWO PLANETS IS " : ABS(B-A)
590 IF C$ = "Y" THEN LPRINT "THE DISTANCE BETWEEN THE "
600 IF C$ = "Y" THEN LPRINT "TWO PLANETS IS " : ABS(B-A)
610 PRINT "
620 PRINT "DO YOU WANT ANOTHER GO?"
630 IF PEEK(20) = 0 THEN 630
635 CLS
640 IF PEEK(20) = 81 THEN 150

```

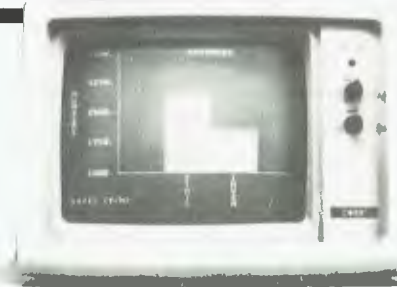
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QLD. Z-Systems (07) 44 3715


```

00505PRINT"THE WINNING HORSE IS NUMBER"
005061FH=H*THENGOTO550
00509PRINT:PRINT:PRINT
00510PRINT"YOU WIN SOME AND YOU LOSE SOME. THIS TIME YOU LOSE SOME"
00511T=T-Z
00512PRINT
00520PRINT:INPUT"PRESS (RETURN) TO CONTINUE"JO$
00525GOTO2020
005501FH=1THENLETY=Z*V:T=T+Y
005511FH=2THENLETY=Z*R:T=T+Y
005521FH=3THENLETY=Z*S:T=T+Y
005531FH=4THENLETY=Z*Q:T=T+Y
005541FH=5THENLETY=Z*K:T=T+Y
005551FH=6THENLETY=Z*P:T=T+Y
005561FH=7THENLETY=Z*J:T=T+Y
00557PRINT:PRINT"YOU WON"Y;" DOLLARS"!!":PRINT
00558Y=0:PRINT:GOTO520
01000CLS:A=36
01020CURSA=34:PRINT"
01030CURSA=2:PRINT"YOUR COMPUTER"
01040A=A+32:IFA=368THENGOTO1050
01045GOTO1020
01050A=47
01052CURSA=31:PRINT"
01054CURSA=1:PRINT"POCKET PROGRAMS"
01055A=A+32:IFA=399THENGOTO1065
01060GOTO1052
01065A=416
01066CURSA=1:PRINT"
01067CURSA:PRINT"PRESENTS"
01068IFA=426THENGOTO1090
01069A=A+1
01070GOTO1066
01090FORA=3TO14:FORQ=1TO20:NEXTQ:PRINT:NEXTA
01100RADA:IFA=0THENGOTO1119
01105CURSA:PRINT"X":GOTO1100
01110DATA 135,167,199,231,263,200,265,233,201,169,137
01111DATA 173,205,237,269,268,267,235,203,171,139,140,141
01112DATA 271,239,207,175,143,144,145,177,209,208,240,273,149,148,147
01113DATA 179,211,212,213,245,277,276,275,153,152,151,183,215,216,247
01114DATA 279,280,281
01115DATA327,328,329,361,393,392,391,359,423,455,424,457
01116DATA 461,429,397,365,333,332,331,363,395,396,427,459
01117DATA465,464,463,431,399,367,335,336,337
01118DATA 469,468,467,435,403,371,339,340,341,404,0
01119CURSA410:PRINT"BY":CURSA440:PRINT"GEORGE":CURSA471:PRINT"GEORGIOU"
01999:ORD=1TO1000:NEXTO
02000CLS:PRINT" WELCOME TO THE TRACK":PRINT:PRINT
02001U=0:T=100
02010PRINT"YOU HAVE $100 TO BET WITH FOR ALL EIGHT RACES."
02015PRINT"THE GAME ENDS AT THE END OF THE EIGHTH RACE OR UNTIL YOU"
02017PRINT"RUN OUT OF MONEY."
02018PRINT:PRINT:PRINT"GOOD LUCK!"
02019PRINT:PRINT:INPUT"PRESS (RETURN) TO CONTINUE"JO$
02020U=U+1:IFU/8THENGOTO5000
02021IFT=0THENGOTO5000
02025CLS:PRINT"YOU HAVE $":T
02027PRINT:PRINT"HOW MUCH MONEY DO YOU WISH TO"
02028PRINT"BET ON RACE":U:INPUTZ:IF(Z=0)OR(Z>T)THENGOTO2025
02029V=INT(RND*10)+2:R=INT(RND*10)+2:S=INT(RND*10)+2:Q=INT(RND*10)+2:K=INT(RND*10)+2:P=INT(RND*10)+2:J=INT(RND*10)+2:CLS
02031PRINT"ND, NAME ODDS":PRINT(A21,45)
02033PRINT"1) EL SOFTWARE "V"/"1":PRINT"2) DYNAMIC RAM "R"/"1"
02035PRINT"3) ACRN "S"/"1"
02040PRINT"4) BLUE CHIP "Q"/"1"
02041PRINT"5) PINK PLANET "K"/"1"
02042PRINT"6) FAR OUT "P"/"1"
02043PRINT"7) DEMON DON "J"/"1"
02044CURS288:PRINT:PRINT"WHICH HORSE":INPUTH
02045IF(H(1)OR(H(7))THENPRINTH" WAS SCRATCHED":FORO=1TO500:NEXTO
02046IF(H(1)OR(H(7))THENCLS:GOTO2031
02098PRINT:INPUT"PRESS (RETURN) TO CONTINUE"JO$
02100GOTO5
05000IFT=100THENGOTO5100
05005IFT=100THENGOTO5200
05010CLS:PRINT"TOO BAD,AT THE END OF TODAY'S"
05011F=100-T:PRINT"RACING YOU LOST":F;" DOLLARS"
05015GOTO6000
05100CLS:F=T-100:PRINT"YOU MADE":F;" DOLLARS PROFIT!!!"
05101PRINT:PRINT"NOT BAD FOR ONE DAYS WORK":GOTO6000
05200CLS:PRINT"YOU BROKE EVEN,NEVER MIND MAYBE"
05210PRINT"YOU WILL WIN SOMETHING NEXT"
05211PRINT"MEETING"
06000CURS288:PRINT"WANT TO PLAY AGAIN":INPUTJO$
06001IFJO$(1,1)="Y"THENCLS:GOTO2000
06002CLS
06003K=0
06004REM
06005A=417
06006CURSA=1:PRINT"
06007CURSA:PRINT"BYE! COME BACK SOON":REM
06008IFK=0THENLETA=A+1:IFA=428THENLETK=9
06010IFK=9THENLETA=A-1:IFA=417THENLETK=0
06015REM
06020GOTO6006
06021REM

```

```

----- RACE 1--
(1)/X 1:
/ \ 1:
(2)/X 1:
/ \ 1F
(3)/X 1:
/ \ 1N
(4)/X 1:
/ \ 1S
(5)/X 1H
/ \ 1:
(6)/X 1:
/ \ 1:
(7)/X 1:
/ \ 1:

```

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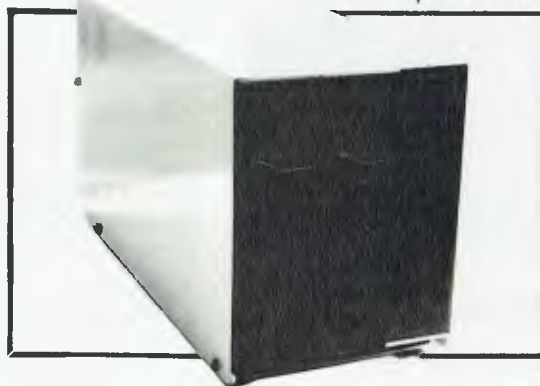
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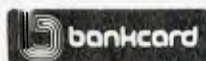
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Tandy PC-2

Autobahn

D. Downs,
Numurka, Vic.

The object is to guide your vehicle down a one way street the wrong way. Along the way, you must dodge Mad Harry, the drunken driver, as well as the usual Sunday drivers.

You receive a free car at every 15 points, and there are three levels of difficulty. To move, use the "/" key to go right, and the "+" key to go left.

```
10 DIM
11 H(6),H(5),C(3,4):T=10:H0="PC-2"
20 FOR I=1 TO 3:READ
C(1,1),C(2,1),C(3,1):NEXT I:FOR I=1 TO
6:READT(1):NEXT I
30 READ H(1),H(2),H(3)
40 DATA
"09060607","060F0F06","00060600","1430301
4","301E1E30","00303000"
50 DATA
"48303048","307B7B30","00303000","030303
","060606","0C0C0C","181818"
60 DATA
"303030","606060","02070207","0B10B1C","
20702070"
```

```
70 CLS:WAIT 0:INPUT "Difficulty ? (1-3)
":ID:IF D<1 OR D>3 THEN 70
80 CLS:S=0:M=3:R=1:PAUSE "AUTOBAHN (c)
1983 D. Downs"
90 PAUSE "CARS (1)MI". SCORE
: "151":P=125
100 CLS:P=P-10:W=0:IF P<30 THEN LET P=30
110 F=0:IF RND (61)<G:CURSOR 130:PRINT S:BEEP
1,200,20:IF RND (10)<1 THEN 130
120 PAUSE "Mad Harry" :FOR L=250 TO
0 STEP -10:BEEP 1,1,10:NEXT L:CLS:W=1
130 IF INT (S/10)>5/10 AND S<0 THEN BEEP
M,99,40:M=M+1:D=D-.5:IF D<1 THEN LET D=1
140 FOR I=1 TO (P/30)/5
150 IF W=1 THEN LET F=RND (6)
160 AS=INKEY$:IF AS="+" THEN 190
170 IF AS="/" THEN LET R=R-2:IF R<1 THEN
LET R=1
180 IF AS="+" THEN LET R=R+2:IF R>5 THEN
LET R=5
190 G:CURSOR P:PRINT H(R):BEEP 1,15,1
200 IF RND (10)<1 THEN LET F=RND
(6):BEEP 1,150,5
210 G:CURSOR (1+3)-2:G:PRINT
"0000000000":I=1:F
220 IF POINT (P-1)<0 THEN IF (R-1)<F OR
(R=F OR (R+1)<F OR (R+2)<F) THEN 240
230 NEXT I:S=S+1:GOTO 100
240 IF R>3 THEN LET R=3
250 WAIT 10:FOR I=1 TO 3:CLS:G:CURSOR
P:BEEP 1,100-(1+2),1+2:D:PRINT
0:1,R:CLS:NEXT I:M=M-1:IF M=0 THEN 270
260 WAIT 0:GOTO 90
270 WAIT 150:PRINT "Final Score = "S:I
S:THEN 290
280 PRINT "Top Score":INPUT "NAME?
":H0=T:S
290 PRINT "Top = "H0:I "T
300 WAIT 0:PRINT "Another Game ? "X
310 AS=INKEY$:IF AS="+" THEN 310
320 IF AS="N" THEN CALL 52593
330 IF AS="Y" THEN 310
340 GOTO 70
```

Vic 20

Scramble

Duncan Morrison, Clayton, Vic

The program is in two parts. One is the character and machine code loader, while the other is the actual game. The game should be saved on tape directly after the loader.

When run the loader will display key movement and instructions. Pushing any key will kill that display and will allow the actual game to be loaded and run.

The rules of the game are simple.

The object is to destroy the alien leader at the end of each run.

To stay alive during each run you must bomb enemy fuel

dumps to replenish your fuel supply.

Scoring is as follows:
5 points for bombing missiles
10 points for bombing fuel
dumps 0 points for bombing
meteors

Machine Code Notes:

The machine code is stored in the cassette machine buffer and is quite safe from accidental
newing.

If you wish to use files after running this program it is recommended that the VIC should be turned off and on again.

KEYS: 'S' = Drop bomb; 'I' = Up; 'M' = Down

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```

5 POKES1,255:POKES2,19:POKES5,255:POKES6,19:CLR
15 POKES6869,242
28 PRINT"*****PRINT*****"PRINT"BY L. MORRISON (C) 1983"
22 PRINT"*****CONTROL*****PRINT*****"PRINT"*****"
24 PRINT"*****DROP BOMB*****"
26 PRINT"*****YOU MUST DESTROY FUEL DUMPS TO REPLENISH THE FUEL LEVEL INDICATOR."
28 PRINT"*****ILL THE BLUE ALIEN TOWIN.*****GOOD LUCK*****"
30 FOR I=0 TO 143
40 READ A
50 POKES120+I,A
60 NEXT I
70 POKES6866,PEEK(36866)OR128
80 DATA 60,36,60,102,255,255,153
90 DATA 36,60,24,44,44,60,44,24
100 DATA 192,160,160,192,0,54,42,34
110 DATA 145,84,48,214,48,84,146,0
120 DATA 24,126,255,255,126,36,66,255
130 DATA 0,128,192,224,255,127,12,24
140 DATA 0,0,96,144,248,0,0
150 DATA 1,2,4,8,0,16,96,128
160 DATA 0,128,96,16,8,0,6,1
170 DATA 68,66,129,129,66,68,0
180 DATA 151,184,0,0,0,0,0,0
190 DATA 0,0,0,0,0,0,145,118
200 DATA 0,0,0,0,0,0,0,0
210 DATA 0,0,0,0,0,0,255
220 DATA 255,129,129,129,129,129,255
230 DATA 24,126,153,153,255,96,66,129
240 DATA 0,126,126,126,0,0,0
250 DATA 1,2,2,1,2,2,2,1
260 FOR I=5264 TO 5390:POKE1,0:NEXT I
270 READ A:IFA=1 THEN 690
280 POKES392+Z,A
290 Z=Z+1
300 OUT0270
310 DATA 160,21,162,1,189,44,30,282,157,44,30,232,189,44,150,202,157,44,150,232,2
32,136
320 DATA 208,236,282,169,32,157,44,30,169,2,141,235,31,169,1,141,235,151
330 DATA 160,21,162,1,189,66,30,282,157,66,30,232,189,66,150,202,157,66,150,232,2
32,136
340 DATA 208,236,282,169,32,157,66,30,169,2,141,235,31,169,1,141,235,151
350 DATA 160,21,162,1,189,88,30,282,157,88,30,232,189,88,150,202,157,88,150,232,2
32,136
360 DATA 208,236,282,169,32,157,88,30,169,2,141,235,31,169,1,141,235,151
370 DATA 160,21,162,1,189,110,30,282,157,110,30,232,189,110,150,202,157,110,150,2
32,232
380 DATA 136,208,236,282,169,32,157,110,30,169,2,141,235,31,169,1,141,235,151
390 DATA 160,21,162,1,189,132,30,282,157,132,30,232,189,132,150,202,157,132,150,2
32,232
400 DATA 136,208,236,282,169,32,157,132,30,169,2,141,235,31,169,1,141,235,151
410 DATA 160,21,162,1,189,154,30,282,157,154,30,232,189,154,150,202,157,154,150,2
32,232
420 DATA 136,208,236,282,169,32,157,154,30,169,2,141,235,31,169,1,141,235,151
430 DATA 160,21,162,1,189,176,30,282,157,176,30,232,189,176,150,202,157,176,150,2
32,232
440 DATA 136,208,236,282,169,32,157,176,30,169,2,141,235,31,169,1,141,235,151
450 DATA 160,21,162,1,189,198,30,282,157,198,30,232,189,198,150,202,157,198,150,2
32,232
460 DATA 136,208,236,282,169,32,157,198,30,169,2,141,235,31,169,1,141,235,151
470 DATA 160,21,162,1,189,220,30,282,157,220,30,232,189,220,150,202,157,220,150,2
32,232
480 DATA 136,208,236,282,169,32,157,220,30,169,2,141,235,31,169,1,141,235,151
490 DATA 160,21,162,1,189,242,30,282,157,242,30,232,189,242,150,202,157,242,150,2
32,232
500 DATA 136,208,236,282,169,32,157,242,30,169,2,141,235,31,169,1,141,235,151
510 DATA 160,21,162,1,189,8,31,282,157,8,31,232,189,8,151,202,157,8,151,232,232
520 DATA 136,208,236,282,169,32,157,8,31,169,2,141,235,31,169,1,141,235,151
530 DATA 160,21,162,1,189,30,31,282,157,30,31,232,189,30,151,202,157,30,151,232,2
32
540 DATA 136,208,236,282,169,32,157,30,31,169,2,141,235,31,169,1,141,235,151
550 DATA 160,21,162,1,189,52,31,282,157,52,31,232,189,52,151,202,157,52,151,232,2
32
560 DATA 136,208,236,282,169,32,157,52,31,169,2,141,235,31,169,1,141,235,151
570 DATA 160,21,162,1,189,74,31,282,157,74,31,232,189,74,151,202,157,74,151,232,2
32
580 DATA 136,208,236,282,169,32,157,74,31,169,2,141,235,31,169,1,141,235,151
590 DATA 160,21,162,1,189,96,31,282,157,96,31,232,189,96,151,202,157,96,151,232,2
32
600 DATA 136,208,236,282,169,32,157,96,31,169,2,141,235,31,169,1,141,235,151
610 DATA 160,21,162,1,189,118,31,282,157,118,31,232,189,118,151,202,157,118,151,2
32,232
620 DATA 136,208,236,282,169,32,157,118,31,169,2,141,235,31,169,1,141,235,151
630 DATA 160,21,162,1,189,140,31,282,157,140,31,232,189,140,151,202,157,140,151,2
32,232
640 DATA 136,208,236,282,169,32,157,140,31,169,2,141,235,31,169,1,141,235,151
645 DATA 235,151
650 DATA 160,21,162,1,189,162,31,282,157,162,31,232,189,162,151,202,157,162,151,2
32,232
660 DATA 136,208,236,282,169,32,157,162,31,169,2,141,235,31,169,1,141,235,151
670 DATA 235,151,96,160,8,162,22,169,14,157,7,31,169,2,157,7,151,152,168,22,232,1
36,288
680 DATA 252,168,136,208,235,96,-1
690 GET#A:IFA#="" THEN 690
695 POKES6867,128
700 POKE198,5:POKE631,78:POKE632,69:POKE633,87:POKE634,13:POKE635,131:END

```

```

5 POKE36867,174:FF=1:DIMV(2):0=3
10 PRINT"*****POKE36879,8:A=7927:POKE649,1:H=0:0=8072:T=0:J=0-3:FU=21:RESTORE:POK
ES2,0
15 CL=36879:POKE36869,253:POKECL,9:S4=36877:POKE36878,15:S2=36874
20 PRINT"*****MISSION*****"
25 FOR I=0 TO 0:POKE36884+I,5:NEXT I:POKE36847,5:POKE36846,5:M=16:H=3
30 PRINT"*****MISSION*****"
50 FOR I=0 TO 6:POKE36840+I,2:NEXT I:FOR I=7 TO 21:POKE36840+I,6:NEXT I:CS=30720
70 FOR I=0 TO 2:POKECS+8164+I,5:NEXT I
100 FOR I=0 TO 21:POKE7680+I,16:NEXT I
105 FOR I=1 TO 25:STEP 2:POKE8164+I,5:POKE8165+I,6:NEXT I
106 FOR I=0 TO 21:POKE8098+I,11:NEXT I
107 GOTO850
110 I=PEEK(197):IFI=12ANDH<NTHENPOKEA-1,32:POKEA,32:A=A-22:H=H+1
120 POKE7680+FU,32:FU=FU-FF:IFFU<0 THEN 800
130 IF I=36ANDH<NTHENPOKEA-1,32:POKEA,32:A=A-22:H=H+1
134 IF I=41ANDH=8ANDQ=0 THEN Z=A+1:H=1:LL=215
140 POKEA-1,32:POKEA,32
143 FOR I=1 TO 2:POKEY(I),32
144 NEXT I
146 IF W=1 THEN POKEZ,32:00SUB600
147 SVS(5392):T=T+1
148 IF W=1 THEN POKECS+Z,7:POKEZ,1
150 POKECS+A,5:POKECS+A+1,5:POKEA-1,5:POKEA,6:IF Q=1 THEN POKECS+Z,7:POKEZ,2
151 FOR I=1 TO 2:IFY(I)=0 THEN GOSUB700
152 NEXT I
153 IF T=10 THEN H=0:M=18
154 IF PEEK(A+1)<32 THEN 800
155 IF RAND(1)>.3ANDPEEK(0)=0ANDY(1)=0 THEN Y(1)=0:POKEY(1),32
156 IF RAND(1)>.3ANDPEEK(1)=0ANDY(2)=0 THEN Y(2)=0:POKEY(2),32
157 IF T=100 THEN POKECL,15:GOTO950
158 IF T=750 THEN POKECL,13:N=11:GOTO900
159 READX:IFX=0 THEN RESTORE:GOTO159
160 IF T=265 THEN 0-9:J=0-3
161 IF T=502 THEN 0-9:J=0-3
162 IF T=2300 THEN 4-9:THENPOKEI-8 TO 0:POKEY7943+I*22,1:T=NEXT
163 IF T=510 THEN W=16
165 READP:IFT=250ANDT<500 THEN POKE7921,X:POKE7943,F:POKECL,11:M=7
166 IFT=251 THEN POKE7943,18
167 IFT=499 THEN POKE7921,18
168 READX:IFX=4 THEN POKECS+8097,4
169 POKE8097,X:IFX=10 THEN POKECS+8075,3:POKE8075,0
170 READX:POKE8119,X:IFX=4 THEN POKECS+8119,4
173 IF RAND(1)>.6ANDT=499 THEN POKE7933+(INT(RND(1)*11)*22),9:POKECL,12
175 GOTO110
550 RETURN
600 IF LL=0 THEN LL=1:POKES2,LL
602 Z=Z+22:IFPEEK(Z)=32ANDPEEK(Z+1)=32 THEN RETURN
610 POKEZ-22,32:IFPEEK(Z)>4ANDNOTPEEK(Z)=9ANDNOTPEEK(Z)=15 THEN Z=Z-22:GOTO660
612 IFPEEK(Z)=15 THEN GOSUB600:GOTO1000
615 IFPEEK(Z)=4 THEN SC=SC+10:GOSUB694:E=1:GOTO660
620 SC=SC+5
660 POKECS+Z,1:POKEZ,3:FOR I=1 TO 50:POKES4,255:NEXT POKES4,32:W=0:POKES2,0:POKES4,0
670 IF E=1ANDT<750 THEN POKECL,11:E=0
690 Z=0:W=0:RETURN
694 IFFU>16 THEN FU=21,2
695 IFFU<17ANDFU>13 THEN FU=18
696 IFFU<14 THEN 698
697 FOR I=0 TO FU:POKE7680+I,16:NEXT RETURN
698 FU=FU+4:FOR I=0 TO FU:POKE7680+I,16:NEXT RETURN
700 Y(I)=Y(I)-23
705 E=PEEK(Y(1))-22:IFNOTE=5ANDNOTE=6ANDNOTE=32 THEN 750
710 IF Y(1)=0ANDY(1)=A-1 THEN Y(1)=0:GOTO800
740 POKEY(Y(1),3):POKEY(Y(1),0):RETURN
750 POKEY(Y(1),3):FOR I=1 TO 50:POKES4,128:NEXT POKEY(Y(1),32:Y(I)=0:POKES4,0
755 RETURN
800 POKE32,0:POKE34,128:POKEA,3:POKEA-1,3:FOR I=1 TO 80:E=INT(8*WAND(1)):POKECS+A,E
810 POKECS+A-1,E:FOR I=1 TO 10:NEXT E:POKEA,32:POKEA-1,32
820 POKE8163+Q*2,32:POKE8164+Q*2,32:POKES4,0
825 G=0-1:IFG<1 THEN POKE8164,32:POKE8165,32:FOR I=1 TO 3000:NEXT PRINT"*****GOTO1110
830 FOR I=0 TO 21:POKE7680+I,16:NEXT FU=21:A=7927:H=8
835 IFT=749ANDT<1022 THEN A=7817:H=14
840 IFT=250ANDT<222 THEN A=8015:H=4
850 POKEA+CS,5:POKEA+CS,5:POKEA,6:POKEA-1,5:FOR I=1 TO 1500:NEXT GOTO157
900 U=INT(3*WAND(1))+1:FOR I=0 TO U:POKE7965+CS-(I*22),2:POKE7965-(I*22),14:NEXT I
910 SVS(6123):U=U+1
920 IF RAND(1)>.6 THEN POKECS+7987-(U*22),4:POKE7987-(U*22),4:GOTO110
930 IF RAND(1)>.5ANDU>3 THEN POKECS+7987-U*22,3:POKE7987-U*22,0:0=7979-U*22:J=7973-U
*22
940 GOTO110
950 U=INT(RND(1)*3)+1:C=INT(RND(1)*7)+1
960 FOR I=0 TO U:POKECS+7767+(I*22),6:POKE7767+(I*22),14:NEXT I
970 FOR I=0 TO U:POKECS+8119-(I*22),6:POKE8119-(I*22),14:NEXT I
975 IF C<7 THEN C=C+1:IF RAND(1)>.6 THEN POKECS+8119-(I*22),3:POKE8119-(I*22),15
980 GOTO110
1000 POKE34,200:FOR I=150 TO 230:POKE36376,1:NEXT POKE36876,0
1101 FOR I=24 TO 1020:STEP 1:POKES4,1:NEXT FOR I=10 TO 80:STEP 1:POKES4,1:NEXT POKES4,0
1183 POKE36869,240
1185 PRINT"*****MISSION COMPLETED *****POKES2,250:PRINT"*****GET READY FOR NEXT *****"
1110 POKE36869,240:PRINT"*****SCORE*****"
1115 IF Q=0 THEN FOR I=1 TO 5000:NEXT I:FF=FF+1:GOTO10
1120 PRINT"*****PLAY AGAIN (Y/N)?*****"
1130 GET#A:IFA#="" THEN FOR I=1 TO 3000:POKES2,0:NEXT I:PRINT"*****"
1140 IFA#="" THEN POKECS,0:RUN
1145 IFA#=""ANDQ=0 THEN FOR I=1 TO 200:NEXT I:POKES2,0:GOTO1185
1147 IFA#="" THEN NEW
1150 GOTO1130
2000 DATA 0,32,32,7,7,32,7,12,10,32,8,12,10,32,8,8,32,32,7,32,8,32,7,32,4,12,
7,32,32
2100 DATA 11,10,32,32,7,8,32,7,12,32,8,10,12,32,7,10,12,32,8,8,12,32,7,32,8,7,32,
10,32,8
2200 DATA 0,32,32,7,32,8,4,12,32,7,32,10,7,32,4,12,10,32,32,8,8,32,32,7,7,32,7,12
,10,32,8
2300 DATA 12,8,32,32,8,7,32,32,11,0,32,32,7,32,8,32,18,32,7,32,8,7,32,32,4
2400 DATA 0,32,32,7,32,8,32,8,32,7,32,7,32,8,7,12,32,7,10,12,7,32,8,12,8,32,7,12,
7
2500 DATA 32,10,12,8,32,8,12,7,32,32,8,10,32,32,7,10,32,4,12,8,32,4,12,7,32,4,12,
8,32
2600 DATA 7,12,32,8,10,12,32,7,8,12,7,12,32,8,8,32,32,7,7,32,32,8,0

```

Doodler

ZX80

R. Chalmers, Brisbane, Qld

DOODLER allows you to draw on the screen.

This is done by POKEing directly to the screen, and lines can be drawn, erased, redrawn as often as you like. Naturally the graphics are chunky, in true ZX style, but quite attractive designs can be created. It shouldn't be hard to design a quite interesting game around this program, with a suitable amount of memory to play in.

When the program is first run you will be faced with a clean

field; you should then press zero, newline. This will position the first dot at the left edge about halfway up the screen. The direction keys are then used to move the dot around, one move at a time. To erase a dot you backspace over it and then press either 1, move left with no plot, or 9, move right with no plot. If you enter a dot and then just press 1 or 9, the last dot you entered will be erased.

Happy doodling!!

```

20  Let A=10
30  Let B=2
40  Let M=0
50  Let P=0
60  Let W=0
70  For I=1 To 640
80  Print Chr$(9)
90  Next I
100 Gosub 290
110 Print "1 WILL DELETE DOTS TO LEFT."
120 Print "9 WILL DELETE DOTS TO RIGHT."
130 Input C
135 If B=1 Then Let B=B+1
136 If B = 32 Then Let B=B-1
140 Gosub 290
160 If C=6 And A<20 Or C=7 And A>1
    Then Let A=A-2*C+13
170 If C=5 Then Let B=B-1
180 If C=8 Then Let B=B+1
190 Let M=M+(A-1)*33+B
200 If Not C=9 Then Goto 240
210 Poke M,9
220 Let B=B+1
230 Goto 130
240 Poke M,20
250 If Not C=1 Then Goto 130
260 Poke M,9
270 Let B=B-1
280 Goto 130
290 Let P=PEEK(16347)
300 If P > 127 Then Let P=P-256
310 Let W=PEEK(16396)+P*256
320 Return
    
```

One arm bandit

A PROGRAM for the gamblers. As it is pure BASIC it could be adapted to machines with graphics and built into quite presentable games.

```

10  Let W=0
15  Let M=0
20  Print ".....ONE ARM BANDIT."
21  Print
30  Print "$1 A GO."
31  Print
32  Print
33  Print
40  Print "HOW MUCH IS IN YOUR KITTY."
45  Input M1
50  Print "$";M1
110 Print
120 Print "DO YOU WANT A LIST OF PAYOFFS."
125 Print "Y/N."
130 Input A$
133 Gif
135 If Not A$="Y" Then Goto 260
140 Print "REEL 1" , "REEL 2" , "REEL 3" , "PAYOFF"
145 Print
150 Print "CHERRY" , "ANY" , "ANY" , "$3"
160 Print "CHERRY" , "CHERRY" , "ANY" , "$5"
170 Print "ORANGE" , "ORANGE" , "BAR" , "$6"
180 Print "BELL" , "BELL" , "ORANGE" , "$8"
190 Print "PLUM" , "PLUM" , "PLUM" , "$10"
200 Print "APPLE" , "APPLE" , "ANY" , "$15"
210 Print "ORANGE" , "ORANGE" , "ORANGE" , "$18"
220 Print "APPLE" , "APPLE" , "APPLE" , "$20"
230 Print "BELL" , "BELL" , "BELL" , "$30"
240 Print "BAR" , "BAR" , "BAR" , "$200"
    
```

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ZX 80

R. Chalmers, Brisbane, Qld

```

250 PRINT
260 DIM A(3)
265 DIM R(3)
267 DIM X(20)
270 FOR X=1 TO 20
272 FOR I=1 TO 3
278 LET X(I)=RND(6)
280 NEXT I
285 NEXT X
322 PRINT "YOU HAVE $";M1+M
330 PRINT "WIT RETURN TO
    PULL HANDLE."
335 INPUT A$
336 CLS
350 FOR I=1 TO 3
356 LET A(I)=X(A(I))
360 CLS
370 IF NOT A(1)=4 THEN GOTO 400
375 IF NOT A(2)=4 THEN LET W=0
376 GOTO 520
380 IF A(3)=4 THEN GOTO 390
385 IF NOT A(3)=2 THEN LET W=0
386 GOTO 520
387 LET W=6
389 GOTO 520
390 LET W=30
395 GOTO 520
400 IF NOT A(1)=5 THEN GOTO 420
405 IF NOT A(2)=5 THEN LET W=0
406 GOTO 520
408 IF NOT A(3)=5 THEN LET W=0
409 GOTO 520
410 LET W=10
415 GOTO 520
420 IF NOT A(1)=3 THEN GOTO 440
425 IF NOT A(2)=3 THEN GOTO 520
428 IF NOT A(3)=3 THEN GOTO 520
430 LET W=200
440 IF NOT A(1)=1 THEN GOTO 460
445 IF A(2)=1 THEN GOTO 450
446 LET W=3
448 GOTO 520
450 LET W=5
455 GOTO 520
460 IF NOT A(1)=2 THEN GOTO 490
465 IF NOT A(2)=2 THEN GOTO 520
468 IF A(3)=3 THEN GOTO 480
470 IF NOT A(3)=2 THEN GOTO 520
475 LET W=18
478 GOTO 520
480 LET W=6
485 GOTO 520
490 IF NOT A(1)=6 THEN GOTO 520
495 IF NOT A(2)=6 THEN GOTO 520
497 IF A(3)=3 THEN GOTO 510
500 IF NOT A(3)=6 THEN GOTO 520
505 LET W=20
508 GOTO 520
510 LET W=15
520 IF NOT W=200 THEN GOTO 527
525 PRINT
526 PRINT "***** JACKPOT *****"
527 PRINT
530 PRINT "YOU WIN $";W
535 PRINT
540 LET M=M-1+W
545 PRINT "AGAIN ? Y/N."
546 PRINT "TO LIST PAYOUTS,KEY P."
550 INPUT A$
551 CLS
552 IF A$="P" THEN GOTO 136
555 IF NOT A$="Y" THEN GOTO 560
556 LET W=0
557 GOTO 320
560 IF M1+M<M1 THEN GOTO 580
562 CLS
565 PRINT "CONGRATULATIONS,
    YOU WON $";M
566 PRINT "YOUR TOTAL NOW = $";M+M1
570 STOP
580 IF M1+M<0 THEN GOTO 595
590 CLS
591 PRINT "TOO BAD, YOU LOST $";-M
592 STOP
595 CLS
600 PRINT "YOU HAVE TO PAY ME $";-M
610 STOP
620 PRINT ;
621 IF NOT A(I)=1 THEN GOTO 630
625 PRINT "CHERRY",
626 RETURN
630 IF NOT A(1)=2 THEN GOTO 640
635 PRINT "ORANGE",
636 RETURN
640 IF NOT A(I)=3 THEN GOTO 650
645 PRINT "BAR",
646 RETURN
650 IF NOT A(I)=4 THEN GOTO 660
655 PRINT "BELL",
656 RETURN
660 IF NOT A(I)=5 THEN GOTO 670
665 PRINT "PLUM",
666 RETURN
670 PRINT "APPLE",
675 RETURN
680 STOP.....

```

ZX80

Pontoon

R. Chalmers, Brisbane, Qld

THIS GAME lets you play against the computer. This is not as difficult as it sounds because the computer, like the banker, can deal itself too many cards and bust.

If you have more than 4K, you can extend the game to include more than one player.

```

2 LET G=0
3 LET H=50
5 CLS
10 LET B=0
20 LET D=0
30 LET E=0
40 LET F=0
41 PRINT "PONTOON(21)"
42 PRINT
43 PRINT "YOU CAN HAVE UP TO 5 CARDS"
44 PRINT "PRESS Y TO DEAL A CARD"
46 PRINT "IF NO MORE CARDS WANTED,KEY N."
47 PRINT "THIS WILL DISPLAY BANKERS HAND."
48 PRINT "IF BANKER ASKS FOR CARD,KEY Y."
49 PRINT
51 PRINT "HOW MUCH IS YOUR BET ?....."
52 INPUT G
53 CLS
54 PRINT "TO DEAL,PRESS Y."
55 PRINT "YOUR BET IS $";G
56 PRINT "TO SEE BANKER,PRESS N."
58 GOSUB 400
59 PRINT
60 PRINT "YOUR CARDS ARE."
65 PRINT
70 PRINT "1 2 3 4 5"
71 PRINT
80 PRINT G;
90 LET A=C
100 GOSUB 700
110 GOSUB 400
120 PRINT "...";C;
130 LET B=C
140 GOSUB 700
150 GOSUB 400
160 PRINT "...";C;
170 LET D=C
180 GOSUB 700
190 GOSUB 400
200 PRINT "...";C;
210 LET E=C
220 GOSUB 700
230 GOSUB 400
240 PRINT "...";D;
250 LET F=D
260 GOSUB 700
270 PRINT ".5 CARD TALK."
275 PRINT "YOU WIN $";G;" YOUR TOTAL
280 PRINT "=$";H+G
285 PRINT "TO GO AGAIN,KEY N/L."
290 INPUT A$
295 IF A$="" THEN GOTO 5
298 STOP
400 INPUT A$
410 IF A$="Y" THEN LET C=RND(10)
420 IF A$="N" THEN GOTO 500
430 RETURN
440 STOP
450 PRINT
460 LET W=0
470 PRINT
480 PRINT "BANKER"
490 PRINT "1 2 3"
500 PRINT
510 LET W=0
515 PRINT
520 PRINT "BANKER"
530 PRINT "1 2 3"
540 PRINT
550 LET Z=RND(10)
560 LET Y=RND(10)
562 IF Z=10 THEN GOTO 567
563 IF Z=10 THEN GOTO 567
564 PRINT Z;"...";X;"...";Y
565 GOTO 580
567 PRINT Z;"...";X;"...";Y
568 GOTO 580
569 PRINT Z;"...";X;"...";Y
570 PRINT
585 IF Z+X+Y<18 THEN PRINT "CARD PLEASE.(Y).";
590 IF Z+X+Y>18 THEN GOTO 630
595 IF Z+X+Y=18 THEN PRINT "ANOTHER CARD BANKER ?"
600 INPUT B$
610 IF B$="Y" THEN LET W=RND(10)
620 PRINT W
630 IF Z+X+Y+W>A+B+D+E+F AND Z+X+Y+W<22
    THEN PRINT "I WIN."
635 IF Z+X+Y+W>A+B+D+E+F AND Z+X+Y+W<22
    THEN LET H=H-G
640 IF Z+X+Y+W<A+B+D+E+F OR Z+X+Y+W>21
    THEN PRINT "YOU WIN."
642 IF Z+X+Y+W<A+B+D+E+F OR Z+X+Y+W>21
    THEN LET H=H+G
645 IF Z+X+Y+W=A+B+D+E+F THEN LET H=H-G
644 IF Z+X+Y+W=A+B+D+E+F THEN PRINT "BANKER PAYS.";
    (Z+X+Y+W)+1;"..YOU LOSE ."
645 PRINT ". $";G;"..YOUR TOTAL = $";H
650 PRINT
655 PRINT "TO GO AGAIN,KEY N/L"
660 INPUT A$
667 GOTO 5
700 IF A+B+D+E+F>21 THEN GOTO 1000
710 IF A+B+D+E+F=21 THEN PRINT "PONTOON."
720 IF A+B+D+E+F<21 THEN RETURN
722 LET H=H+G
725 PRINT "YOU WIN.$";G;"..YOUR TOTAL = $";H
730 PRINT
735 PRINT "TO GO AGAIN,KEY N/L"
736 INPUT A$
737 GOTO 5
1000 PRINT
1005 LET H=H-G
1010 PRINT
1015 PRINT "YOU BUSTED.(OVER 21)."
1018 PRINT "YOU LOST $";G;"..YOUR TOTAL = $";H
1020 PRINT
1030 PRINT "TO GO AGAIN,KEY N/L."
1040 INPUT A$
1050 GOTO 5

```

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More hardware	call	call

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Tim Hartnell



I'M CURRENTLY sitting in my hotel room in New York, just across the road from Central Park, a day after having bought an IBM-PCjr, and four days after experiencing the West Coast Computer Faire in San Francisco.

I'll deal with the IBM-PCjr first, and then get to the Faire. The Junior stinks. It costs nearly \$US1400 when bought in the top configuration; the lower one (which does not have a disk drive, but otherwise seems identical) costs just under \$US700.

The cable which connects the computer to the TV is described as an 'optional extra', for which IBM stings you \$US35. The much-touted keyboard which does not need a wire to connect it to the processor (it works by infra-red, like TV remote control units) is boring to use. The keyboard has to point right at the system unit to work, so if you're typing on your knees you can't let the keyboard tilt back even a fraction, because then the thing won't work. An 'optional extra' keyboard cable is available.

The keyboard is rubber, but the

keys feel and act like real ones, rather than the squishy ones on the Spectrum. However, IBM has put the key legends *behind* the keys (rather than on top), so you have to hunch over the keyboard to read what each one does. Horrors.

But the real disaster is to come. When I got the computer home I loaded the DOS (Disk Operating System) disk and turned the computer on; everything seemed fine. The computer is supplied with 'Cassette BASIC' as standard, and a more flexible BASIC is supplied on the DOS disk – but when I tried to load it, the disk refused to allow me to, printing on the screen 'Cartridge required'.

I thought I might have been doing something wrong, so I decided to load some programs I had written on the Junior's big brother, the IBM-PC. And this is the real disaster: the disk system is 'read only' unless you buy a \$US75 'optional extra' plug-in cartridge. Only after you buy this will the computer let you load the on-board BASIC. Can you imagine why ▶

Most people who've learnt to use a computer by their own efforts have heard of Tim Hartnell: the whiz-kid Australian who went to the UK as a journalist and ended up founding his own publishing house, Interface Publications, which specialises in publishing books about computing – often written by startlingly young authors. Although he's based in London, Hartnell travels regularly both to the United States and back to Melbourne, where his company is headquartered in Australia. He will be sending occasional 'letters' to 'Your Computer' containing news of current events in the computer world – and his own outspoken opinions about them.

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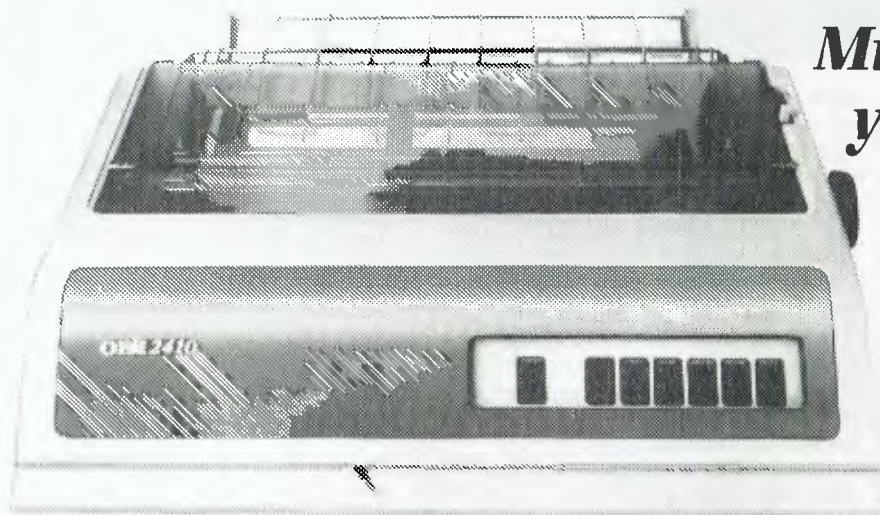
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a computer manufacturer would have decided to sell a computer with a disk system that could only be used to run commercial software unless you buy an 'optional extra'?

For \$US100 more than I paid I could have bought a Kaypro II from the same store, complete with real keyboard and thousands of dollars worth of real software (a word processor and the like), plus two disks and a built-in monitor. The IBM-PCjr is a real turkey.

Sunny San Francisco - and Grey Suits

In San Francisco, the sun was shining (in contrast to last year, when it rained right through the show) for the ninth West Coast Computer Faire. Jim Warren, who started the show when he was a typical Californian hippie of the seventies, actually turned up to his final show (he's just sold it to the book publishing giant Prentice-Hall) wearing a tie, which just shows you the dangers of getting rich. He told me the show had become "a real bitch", and he was extremely glad to be shot of it.

In the beginning (that is, nine years ago) the WCCF was a great big carnival. Apple was launched there (when the only five Apples which existed in the world were on the stand), the Osborne first saw the light of day there, and the show was an exciting event to take part in.

Now all that has changed. Unlike some of the big shows which combine the business with the fun parts of computing quite successfully, this show has become all dull men in grey suits. There was only *one* stand (and the show is comparable with the March PC84 extravaganza in Sydney) displaying games software you could actually try out - the Atarisoft stand. The two biggest stands were IBM's with the Junior (the stand was deserted for much of the show), and Apple's with the Macintosh. You couldn't get within 20 feet of a Macintosh for most of the show, and during demonstrations the crowds blocked the aisles, and even spilled onto the neighbouring IBM stand. I bet that thrilled the IBM people.

There were more book publishers exhibiting than computer manufacturers.

Commodore didn't even bother to show up. The focus and excitement have definitely left the WCCF, and now with Prentice-Hall in charge the men in grey suits are certain to dominate more convincingly in the coming months.

Speakers were a Treat

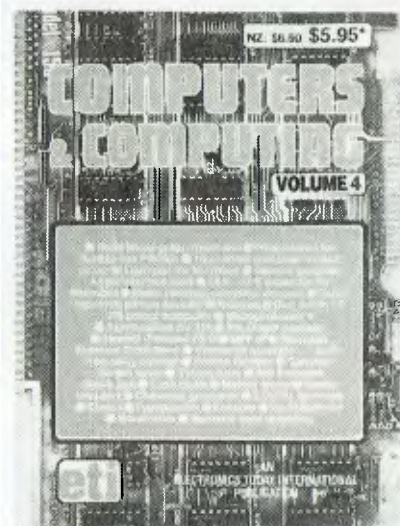
One real treat of the show was the guest speakers. I heard Jerry Pournelle (he writes the 'Users Column' in *Byte* magazine), and his talk was as random and wayward as his columns, but still fascinating to hear.

Adam Osborne, looking very English in a three-piece (grey, of course) suit, got a huge crowd. He said he didn't want to talk about his failed company, but observed that, "In this industry, when people get knocked to the ground, they get back up and start again." This powerful homily brought riotous applause - but then Americans were always suckers for praise and moralistic statements (but perhaps we all are ...).

Anyway, Adam explained how his new scheme, a software distribution system which would handle software like books, would set the software world on fire in the next four or five months. Drawing an analogy with orange producers, who grow the oranges then sell them to a company which sorts and packs them and gets them into retail stores, he said his company would buy programs from around 30 small independent programming houses (the 'orange producers'), and provide all the marketing. The programmers would use a set of uniform standards, so once you'd learned to work one program from his company you would be well on the way to being able to operate the others.

It sounded plausible, and very reasonable, but a hell of a step down from single-handedly restructuring the whole way computers were sold. It will be interesting to see how Adam makes out. He certainly doesn't have much trouble getting media coverage, and that is a very big plus indeed.

I spoke to him at a party given by Microsoft's Bill Gates that night, and he said his plan included setting up, or using, software houses overseas. So start typing. □



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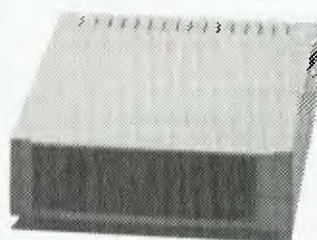


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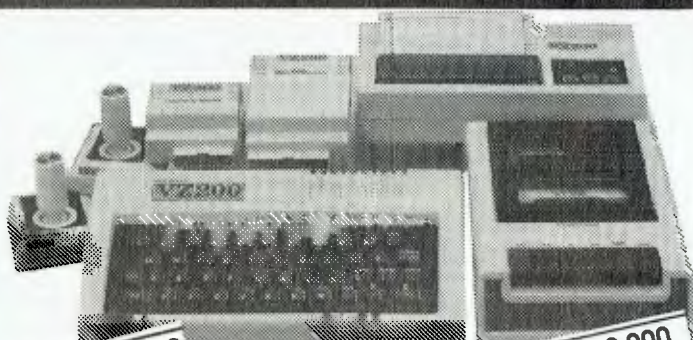
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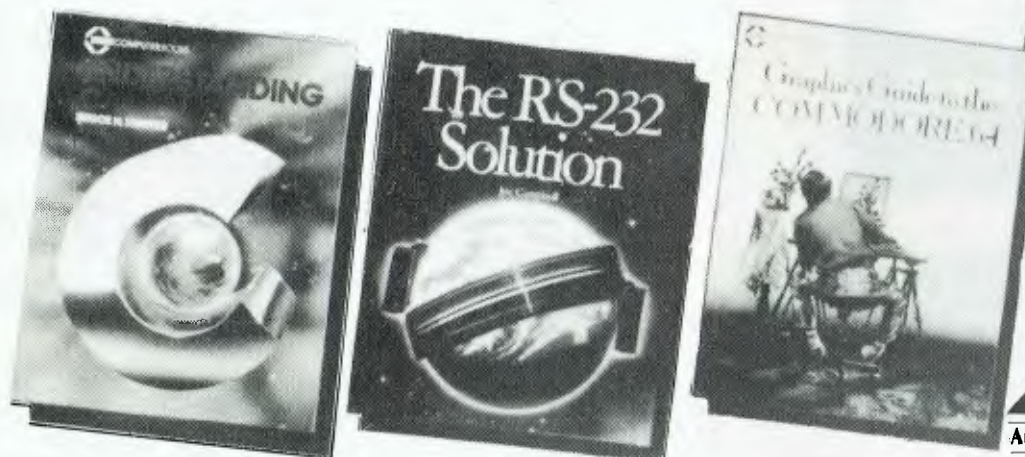
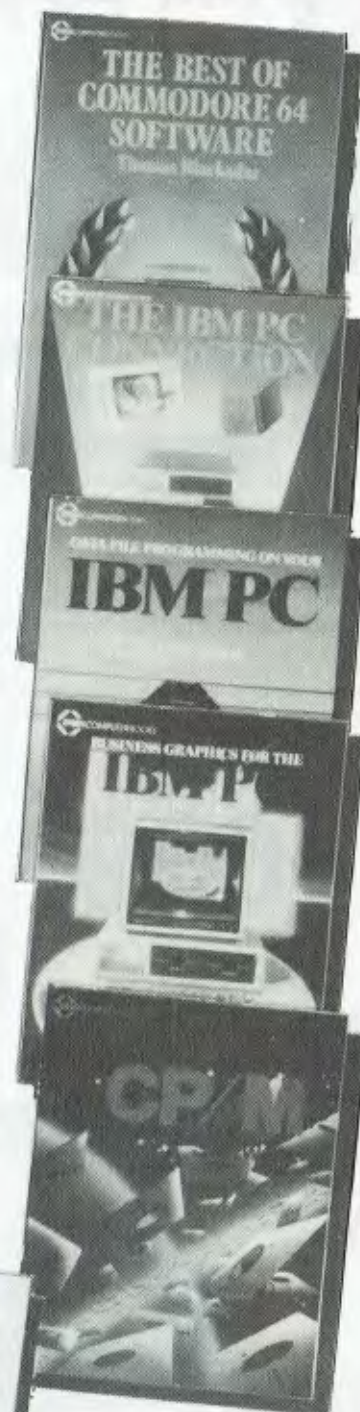
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It strikes most people as strange that while Les Bell has a number of modern languages in his office, such as Pascal, C and others, he still prefers to write programs in a language invented by IBM in 1962. Here he puts his case by describing two tools he uses.

Access Manager Display Manager

A FEW MONTHS ago, in these pages, I reviewed Digital Research's PL/I-80 compiler, and attempted to give a feeling for the flavour of this one-size-fits-all language. As I mentioned, PL/I can be used for commercial programming, for systems programming and utilities, scientific programming, in fact for almost everything. It looks rather like Pascal, when written well, but has none of the restraints of that language.

I've been using PL/I intensively for almost a year now, and have hardly written a line of any other language for remotely commercial applications. PL/I, to extend the Swiss Army knife analogy, is more like a cut-throat razor: it will give you an extremely close shave, but you may also cut yourself with it. So far, I've had a few nicks but none of them were serious.

The most curious of these is the decision by Digital Research to produce one set of documentation for all the various versions of the compiler. The documentation is in fact for the full Subset G, but occasionally one runs across patches in the DRI compiler where it does not implement the full Subset G way of doing things.

For example, the INDEX function, which performs sub-string searches, is documented as taking three parameters: the string to be searched, the string to search for, and the starting position in the searched string.

Unfortunately, the DRI PL/I-80 V1.4 compiler ignores the last parameter, and searches the full string all the time, and there is no mention of this in the manuals.

Incidentally, when I first wrote of PL/I, I was using version 1.3. I have now upgraded to 1.4 and am very pleased. The compiler now supports full 53-bit (meaning double precision) floating point, plus a few other new niceties like file locking and file passwords on operating systems that support them.

Most importantly, the documentation has been upgraded. The manuals now come in two IBM-style slipcases: one for the PL/I Language and Applications Manuals, and one for the Programmer's Utilities (RMAC, LINK, and so on). The documentation is superb.

But enough of PL/I. The real reason for this article is to describe

two other packages which, while they work with PL/I, also work with Pascal/MT+ and the CBASIC Compiler (CB-80/CB-86). The first of these, Display Manager, is a screen handler and terminal driver, while Access Manager is designed to add indexed files and multi-user operation to programs.

Both packages are supplied as relocatable object code files which can be linked with the user's programs, together with any utilities which may be necessary.

Display Manager

Display Manager is the most obviously beneficial to applications programmers. It allows the user to create data entry and display screens, making use of the various display attributes on popular video terminals, and then allows the user to perform data entry, editing and other functions.



Most terminals, even so-called 'dumb' terminals, provide a number of display enhancements. These typically include half intensity, inverse video, underlining, flashing, and control of visibility, although some terminals have additional facilities, such as colour.

Most languages do not allow the programmer direct access to these facilities, and so they must be controlled by sending escape sequences or control codes to the terminal. The trouble is that every terminal uses different codes, meaning that the program must be recompiled or patched whenever it is installed on a new machine.

Display Manager tackles this problem first. Before using any of the DM functions in a program, the programmer must initialise the DM subsystem by passing it a 250-character string which describes the characteristics of the particular terminal being used. Typically, this string is read from a configuration file. All that is required is a different configuration file for each installation – and Digital Research provide the control codes for the most popular terminals in a master file.

This means that programs no longer need to be recompiled or patched for installation. In fact, DRI provides a sample installation program, written in CB-80, which reads the master file and allows the user to select a terminal from a menu. This can be modified to allow different file formats, so that printer customisation can be done in the same way, and of course, new terminals can be custom-installed.

The main feature of Display Manager, however, is its ability to allow the programmer to create a file of screen displays which can be presented to the user as forms for completion. The main program to do this is a full-screen editor, DM80.COM, which is supplied in uninstalled form as DM80U.COM and installed by an installation program DM80SET.COM. DM80 makes extensive use of Display Manager features and is a good example of the kind of things which can be done with the package.

DM80 is an interactive full-screen editor, which allows the user to select one of up to 255 screens stored in a display file. Each screen has a number and a descriptive title, and is stored in compressed form inside the display file. When a display is selected for editing, the user has the option of setting some global parameters, such as whether or not the screen is cleared before the form is

displayed, and then the editor goes into full-screen mode.

Now prompts and fields can be entered anywhere on the screen. To define a field, the programmer types ↑ UI or ↑ UO (for input or output) and then moves the cursor to the end of the field. The display will show i's or o's to represent the width of the field, and when it is the right width, pressing escape returns the editor to standard operation. Now pressing ↑ W will display a window containing the field parameters.

The input field status window shows the position and length of the field, and also whether it has 'posts'. These are blank character positions on either side of the field, which are needed on some CRTs to store certain attribute control characters.

The status window also contains information about the way the contents of the field will be displayed: number of digits after the decimal point, whether commas will be used in amounts, and of course, the video attributes mentioned above. For input fields only, the window also shows the kind of validation performed on input – for example, accepting only integer or numeric input, or converting characters to upper case – as well as whether to beep on invalid input and whether to automatically return to the calling program when the field is full, or to wait for a carriage return.

Another useful capability of input fields is the ability to insert template characters which guide the user's input but are not returned to the calling program. An example might be brackets and dashes in a telephone number or slashes in a date format. The DM80 editor has a rich set of commands for inserting and deleting characters and lines, centring text and so on.

Up to 255 screens can be created and saved in a single screens file. The screens file is automatically opened by the Display Manager run-time code, and screens can be selectively displayed. To use the system from a program, several things have to be done.

The run-time part of Display Manager consists of a set of relocatable routines, supplied in a format suitable for linking with PL/I, CB-80 and Pascal/MT+ programs. This means that it is linked with the program at link time, and before it is linked the program must know the names of the various modules.

Generally, this is achieved by including a declarations file into your program at compile time; this file contains the declarations of all the

externally compiled Display Manager modules. Once your program knows the types of the routines, you can go ahead and use them.

Near the beginning of your program, you should open the terminal definition file and read a 250-character string from it. This string is then passed to Display Manager by the call:

```
i = initdm(str_250);
```

(or whatever passes in your language). The integer variable *i* will be assigned the returned error code, which should usually be zero, unless an error occurs, in which case it will be negative. (Pascal/MT+ returns a char result).

Next should come code to open the display file:

```
i = opndis(file_name);
```

and to display the first screen:

```
i = dispd(screen_number);
```

Two functions allow movement within the screen: *nxtrf(j)* moves forwards and backwards, while *posf(j)* moves to a particular field (fields are numbered, by the way). To read data from a field, use *getf()*, which returns a character string, and to output, use: *i = putf(string);*

Functions are provided to clear the screen, to override the attributes of a particular field (for example, to highlight erroneous input), and to detect the character which terminated input, such as a function key or control key. Fields can also be updated or edited.

About the only function which is not provided, but which is obviously coded within the package, is absolute cursor positioning, *a la* UCSD Pascal's *GoToXY* function. The provision of this feature would make DM doubly useful, as it would allow full-screen editing. I would also like to see the provision of a 'Clear All Unprotected' function, which, while it is unsupported by many dumb terminals, would speed data entry screen refreshes considerably.

Access Manager

A common requirement, in business systems particularly, is to look up a particular record based on customer name, number or some other key. While some systems solve this by sorting the file and maintaining it in the appropriate order, this is a time-consuming process which often introduces interperate delays.

An alternative process much used in mainframe computer systems is the use of index files to provide fast access to the correct record of the main file. Often, the index file is maintained as a tree structure which never needs sorting and guarantees

fast access to the main file.

Several microcomputer packages use this technique: dBase II, for example, makes extensive use of index files, and a number of ISAM 'add-ons' have been available for popular languages such as Microsoft BASIC. However, these packages have usually been pretty big, and generally difficult to use. Reliability seems to have been a difficulty in some cases, too.

Another difficulty faced by many business systems is what to do on multi-user computer systems when two people both try to update a record at the same time. This example will show what I mean.

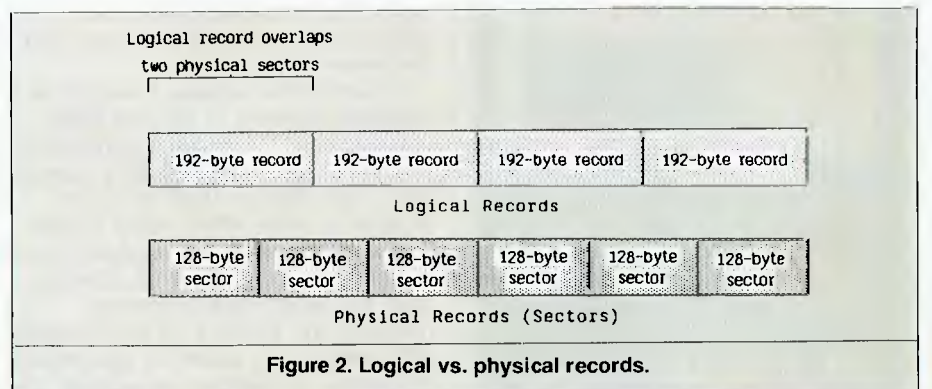
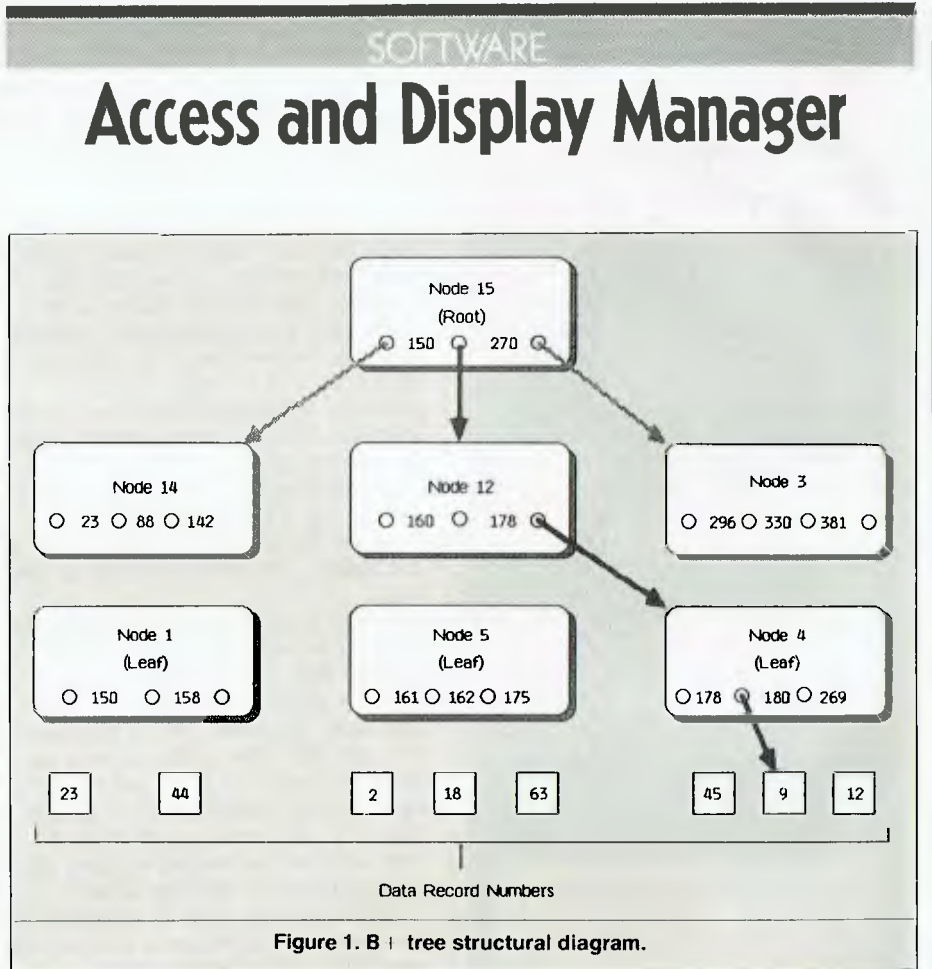
Suppose the Acme Widget Corporation is using a computer to maintain its inventory records, and that each of the ten telephone sales clerks has a computer terminal which he can use to place orders and enquire about stock levels. Suppose also that within the space of a few minutes, both Albert Armstrong and Brian Beaver take an enquiry about Acme's special hinged widgets.

Albert keys in the product code, the computer uses indexed file access to find the inventory record and the display tells him that there are thirty widgets in stock. He tells the customer this; only as he is doing so Brian is keying in the same product code, the computer accesses the same record and displays a stock quantity of thirty.

"Fine," says Albert's customer, "I'll take twenty". So Albert keys in the order and presses the TRANSMIT key. The computer starts processing the order, but while it is doing so, Brian's customer decides he wants twenty-five widgets and Brian keys that in and presses TRANSMIT. By now the computer is up to adjusting the inventory system, so it deducts Albert's order from the stock on hand, leaving ten widgets in stock. Seconds later, it processes Brian's order and (assuming the worst) subtracts twenty-five from ten, leaving minus fifteen.

The result is that Brian's customer gets left in the lurch - he ordered twenty-five widgets; the company had them in stock; so where are they? A worse situation can occur when both orders are simultaneously subtracted from the original record and then written back; only the later update is recorded so that although 45 widgets were sold, the inventory now shows five left in stock!

In proper commercial transaction processing systems a system called record locking is used to get around



this problem. Whenever a program accesses a record, other programs are either barred from using it at all, or barred from writing to it until the original 'owner' releases it. An alternative is file locking, which bars simultaneous access to an entire file.

Access Manager provides an advanced form of this facility for multi-user micro systems based on the MP/M II operating system. While MP/M II does provide record and file locking, Access Manager extends this capability considerably.

Index Files

But first, index files. Access

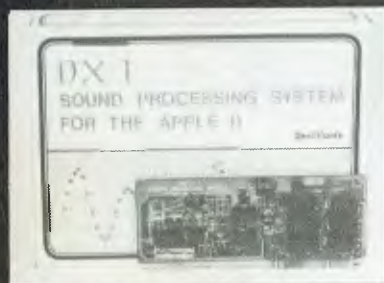
Manager allows the programmer to open up to 10 index files and 20 data files at any time under CP/M, or 40 index files and 40 data files under MP/M II (of course, there's nothing to stop programs accessing files directly if more are required). Index files can be up to 8 Mbytes in size, and data files up to 8 Mbytes on CP/M or 32 Mbytes on MP/M II.

Data files must consist of fixed-length records, in exactly the same way as most languages treat random access files. The internal structure of each record is dictated by the program.

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SOFTWARE

Access and Display Manager

Index files simply contain the key value for each record together with its record number in the data file. However, the internal structure of index files is not that simple; Access Manager makes use of a structure known as a B+ Tree. This is a multi-way height-balanced tree (all the branches are the same length), and guarantees the minimum number of disk accesses to locate a particular key. In the B+ variation of the B-Tree, all the key values are stored in the leaves (bottom-most level) of the tree.

Figure 1 (after the DRI documentation) shows how B+ Trees work. To find the data record with key value 180, the system first accesses the root node. Because 180 is between 150 and 270, the middle branch is taken, to node 12. Here we take the right branch, because 180 is greater than 178, and wind up at node 4. Here we find the record number (9) corresponding to the key value.

AM80 provides sets of functions for the creation, maintenance and use of index files. Like Display Manager, it has to be initialised before use, although this is more important in a multi-user environment.

Under MP/M, Access Manager is a separate program in its own right, and applications programs communicate with it by reading and writing queues. Since the code to read and write queues is quite small, using Access Manager in multi-user programs does not add appreciably to the program size. For single-user programs, however, the full size of the required AM programs is added to the original program — an addition of around 16K.

Routines are provided to open and close index files, erase them and obtain statistics about the number of keys and number of nodes. And naturally, the user can add and delete keys, search for keys and traverse the tree in either direction. A major improvement over AM's predecessor, BT-80, is the ability to position the system directly at the first or last key.

A similar set of functions is provided for data files. Here the added functionality of Access Manager is in the area of record locking, rather than growing trees. Similar functions are provided for creating and accessing

data files, as well as the FRELOK and SETLOK functions for record locking.

Access Manager does not directly link the data and index files, unlike BT-80. Instead, the user must write a random record, then pass the key and record number to the routine which creates the index entry. To locate a particular record, one must perform an index search, which returns the record location; this is then read by standard file access techniques or through Access Manager.

A large part of the benefit of using Access Manager and Display Manager is the consistent approach to file and device access. Instead of using a variety of ways of writing files or handling screen input, everything is done the same way. The result is considerably more consistent — and hence reliable — code.

Documentation

We've come a long way, baby. The days of DRI documentation being stapled together at the top corner are long gone; the manuals for both Display Manager and Access Manager are professionally produced, bound in a cloth slipcase. In fact — and this may be a first — the manual for Display Manager is actually typeset!

Both manuals are well organised, with comprehensive examples in all the relevant languages. Examples are also supplied on disk, ready for compilation and execution.

The Access Manager documentation is actually split into a Reference Manual and a Programmer's Manual; the first explains the underlying principles and supplies details of the functions, while the second is specific to the CP/M or CP/M-86 family of operating systems.

Both Access Manager and Display Manager are available for CP/M-80, CP/M-86 and PC-DOS operating systems, although Access Manager is of most benefit with MP/M II or MP/M-86. For CP/M-86, Access Manager and Display Manager cost \$511.52 and \$639.00 respectively, while for CP/M-80, they are \$400.52 and \$517.00 (all including tax). We obtained our copies from Compotron Pty Ltd, 252 Abbotsford Road, Mayne 4006.

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STATISTICS:

Author: Mr M.P. Bryant

Publisher: CDS Microsystems

Language: 6502 assembly

Code size: 26K

Data size: 5K

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Estimated rating: 1750 + ELO

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Chess	Acornsoft	BBC	16.0
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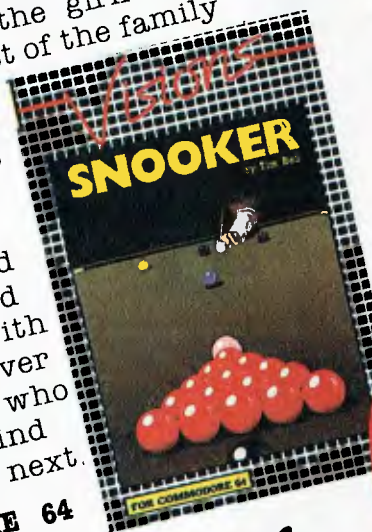
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FAST LOADING



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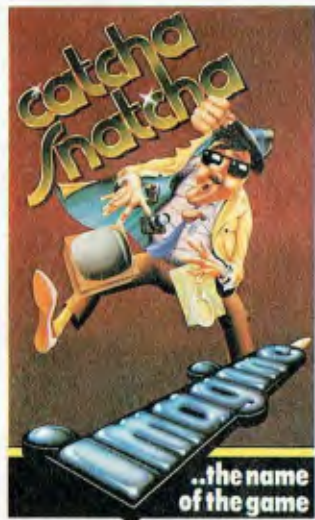
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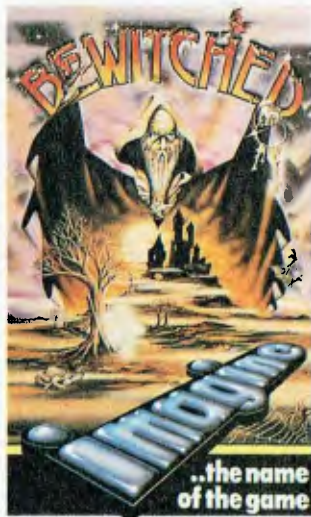
Barney Bootlace, is demoted from ace detective of the aristocracy to the level of mere store detective at one of the craziest run-down stores in town.

It's a hectic life for the hardened crime fighter when he has to look after lost children, taking them to the lost children's office in the top left hand corner of the shop. He must also rush the lost umbrellas and handbags to the lost property office ready for the careless owners to fetch. The lost property office is in the top right hand corner of the shop. At least some variety enters into the action when the occasional bungling shop-lifter attempts to remove a box off the counter and get away with it. Barney has to grab the box and return it to the manager's office to prove it was shop-lifting, but watch those shop-lifters run as you try to grab that box. They hide the box under their coats and you have to keep your eye on them in case they get mixed up with the other shoppers. There is one time our hero has reason to panic — when the occasional customer drops a parcel bomb in the rows between the counters.

VIC 20

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You have allowed the evil magician Mordread to cast you down into the haunted maze of dungeons beneath his dark and forbidding castle.



He has transformed you into a magical key to roam for eternity through the haunted labyrinths below ground, whilst he enslaves all those who live above.

There are four sets of different coloured doors, all of which must be opened before you can gain freedom, and all the time you are at the mercy of hordes of ghosts and ghouls intent on hampering your progress. At the entrance to the maze there are four coloured keys, the colours corresponding to those of the doors. You must pass through one of these keys to become the same colour, and only then can you open the corresponding doors.

You must escape from this dank, evil place so that you can repel the forces of darkness and bring light and liberty to the land once again.

VIC 20

FAST LOADING

ARCADIA

The spaceship Arcadia has been specially equipped with dual Plasma Disrupter guns and an Ion Thrust Drive in order to combat the deadly menace of the many alien races of the Atarian Empire. Your mission as commander of the Arcadia is quite simple — to destroy as many of the enemy as possible. Intelligence reports indicate that the Atarian fleets will attack in formation and are often quite suicidal in their methods.

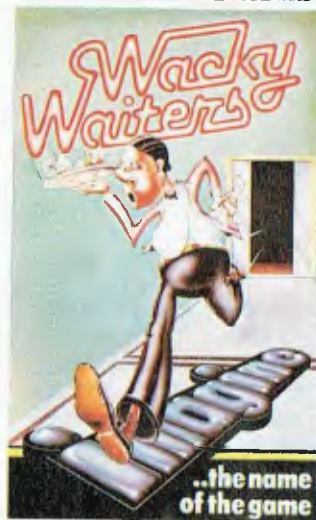


If you manage to destroy the entire fleet within this time another fleet will attack you. ARCADIA works on the basic unexpanded VIC-20, requiring no memory expansion or peripherals except the standard Commodore cassette recorder.

VIC 20

Commodore 64

WACKY WAITERS



You enter this rather ramshackle place to find that the vacancy is for a waiter. Pure desperation for work makes you apply for the job, and the mean-looking boss decides you'll do but warns he'll keep an eye on you.

It doesn't take long for the first guest to scream for service, so off you run to find out what they require. Into the first lift you leap as it passes, taking you up into the building. You have been called to the third floor so on that floor you leap out. You have to wait for the next lift to pass and leap in. You timed it wrong and your tip is dropping, but you'll soon learn. The lift finally passes. In you dive. Now you have the knack, you race into the lift and so on to the next.

You are only paid by tips and the quicker you learn this waiter lark the better for you.

VIC 20

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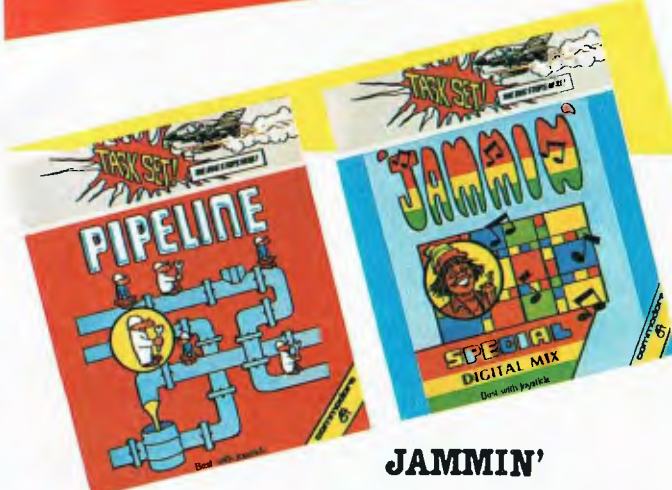
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PIPELINE

You are the **FOREMAN**. Your job is to keep the pipeline open. Take workmen to fix plugs. Watch out for the evil Ladderman. His mission is to plug the pipeline and stop you saving thousands of gallons.

- ☐ JOYSTICK COMPATIBLE
- ☐ COMMODORE 64



HUNCHBACK

QUASIMODO must rescue the imprisoned Esmerelda from the castle stronghold. Jump along the Ramparts, swing over the Fiery pit, dodge the Arrows and Fireballs and remember to keep ahead of the chasing Knight. 15 Screens of fun and excitement and each one more difficult than the last.

- ☐ COMMODORE 64

JAMMIN'

Guide Rankin Rodney through the top twenty mazes to number one, collecting the instruments and bringing them home. Avoid bum notes and distortion, and rescue the instruments from discords. Use joystick and jump button together to step onto the moving circles.

- ☐ JOYSTICK COMPATIBLE
- ☐ COMMODORE 64



CHINESE JUGGLER

Spin the plates in this 3-D simulation of the classic game. Requires skill, speed and judgment.

You can also do real juggling tricks like tossing up the plates and catching them, this comes in useful because they change colour at random and the different colours rate different scores.

- ☐ COMMODORE 64



COSMIC CONVOY

Planets in the system Coman are dying. Millions of people need supplies urgently. A relief convoy is assembled in orbit around Com-Alpha. Your task is to guard that convoy to the next planet-fall. You command a squadron of H-Vips, each with a fully sorted Gon-4 stab laser. You know that the convoy must cross the Trans-Com freight lanes where the meanest space pirates could pounce. Survive long enough to escort the supplies to Com-Beta and become an Admiral — but the next planet in the system still needs supplies.

- ☐ COMMODORE 64



MR WIMPY

Mr Wimpy's task is to make his delicious Burgers and you must guide him around the screen to achieve this. First assemble the ingredients, avoiding the moving manholes and Waldo the burger-thief. Now make the Wimpy Burgers, avoiding the kitchen rebels. If you are trapped by the rebels you can pepper them into oblivion but only three times, unless you pick up the bonus gems, the ice cream or the cup of coffee, which gives you more chances to shoot.

- ☐ COMMODORE 64

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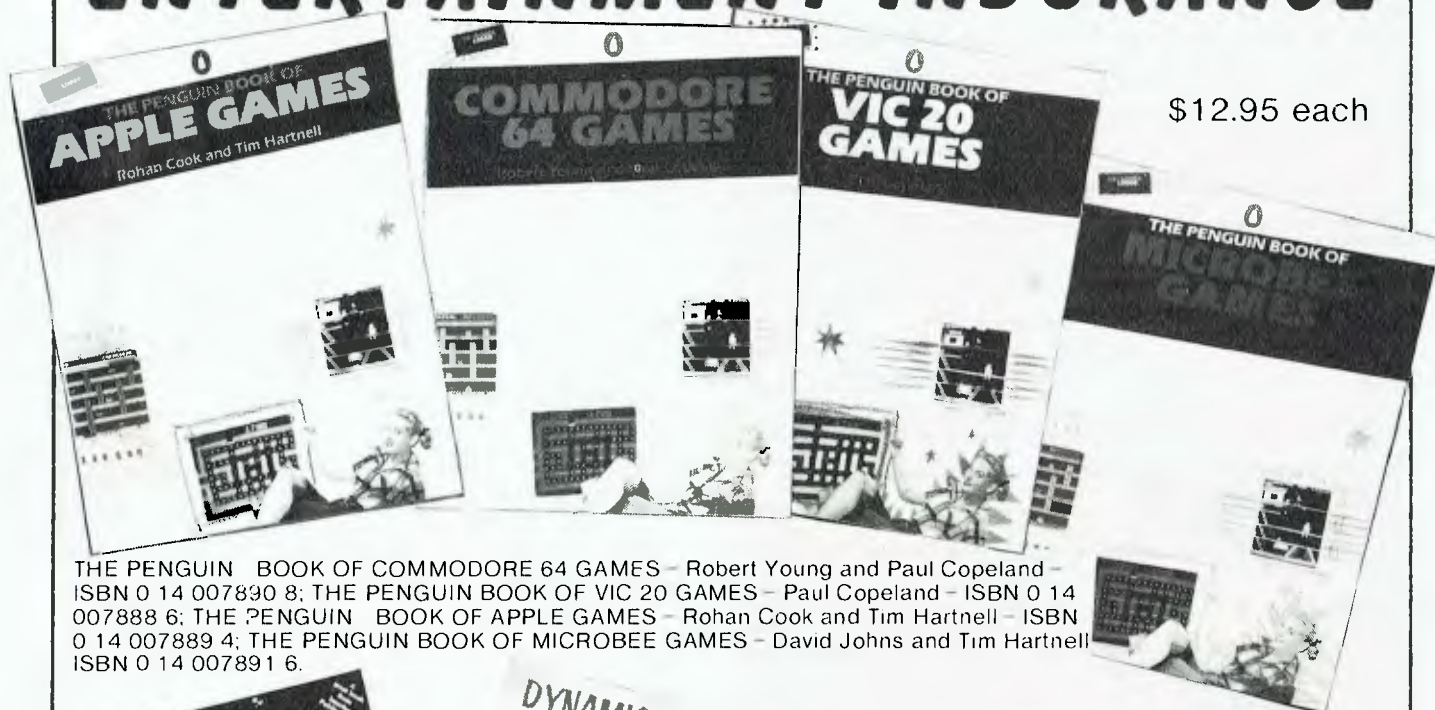
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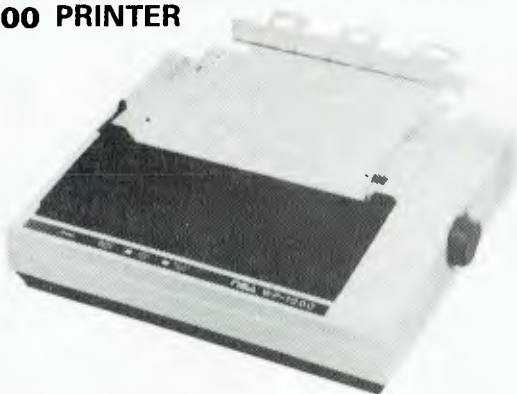
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Terminapple

Terminapple by K-RAM Software silences my disappointment in communications programs. First, it has a great manual. The inexperienced user can run through the tutorial, which starts at 'Setting Up' and moves gradually to the more advanced features.

Second, it is simple to use. All the things you need to know are displayed on the top line of the screen. To drive Terminapple, you only have to use four keys (Escape, Return and the arrows). My goldfish could do that!

Third, it has advanced features. Terminapple supports seven and eight-bit characters; odd, even and no parity; control characters; local echo, error checking, full or half duplex, and the list goes on. I will concentrate on the features that Terminapple excels in.

Let us say you communicate to many places, and each place needs a password. In many cases you may have to type ten lines of passwords just to find out the latest stock prices. Terminapple will do these log-ons for you — *quickly*.

Terminapple Time Lord

Most communications programs allow you to receive information into memory. You then have to save it as a file on disk, to print later. Other programs allow the information to be sent to the printer or screen. Terminapple incorporates all these features and more. Incoming information can immediately be sent to a file on the disk, the screen and the printer — all at the same time and at high speeds.

Telecopy

If you are talking to someone else who is using Terminapple, it is possible to send them an entire disk, or any disk file in Pascal or Apple DOS, over the telephone. Sending and receiving directly to disk is usually dangerous. If one byte is not sent or received correctly, the entire file or disk may not work. K-RAM Software has introduced a unique error-checking means of communicat-

Terminapple will wait until the line is better, fix all the errors and continue to send and receive.

Break-Out

One small but useful feature of Terminapple is the 'Break' function. If you select Break, a delay will be sent to the other computer. Large computers have the occasional urge to send pages and pages of information which you do not need. Break will tell them to shut up.

What You Need

Terminapple will run on any Apple II, II+ or IIe. You must have either an Apple, Vision-80, Digicard or Videx 80-column card, and a serial card. Only 48K is required; however, if you have 64K Terminapple will use it. Terminapple comes on disk, one copy on each side, and update copies are available at ten dollars each.

If you are jumping into communications, it is a big financial leap. For starters, a decent modem and serial card will cost around \$400, and you can expect to pay \$80 for a cable. Terminapple, an Australian program, is not tied with import duties and is inexpensive at \$120.

Bad Points

Terminapple does not yet support CP/M files and disks, but I believe this is being taken into consideration. The main problem in writing a 'do all' program is fitting it in memory and leaving adequate space for the user to work. Terminapple takes up a lot of room and only leaves around 30K as a buffer. The answer to this is: if you need to receive more than 30K, receive the information directly to disk; your disk drive thus becomes a 140K buffer.

I'm afraid there aren't any more bad points!

Conclusion

Terminapple is a fast, well-written communications program which has many features and is simple to use — and it's cheap, too!

You can get hold of a copy of Terminapple by contacting Paul Zavros on (02) 29-4678 during business hours.

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Data '84, the latest computer show to be held in Sydney this year, was an odd mixture of taste sensations proffered to what one might have thought was a rather sated public. But it seems there are a few notches left in the belt of the grey-suited customer to take in new computer sustenance, even if the fare is a little stale.

Data '84



Top: HP's Thinkjet printer's disposable printhead.

Right: Nashua's data conversion system, which copies data from 20 cm disks to 13 cm disks and vice versa.



By Natalie Filatoff

THERE WAS hardly anything new at Data '84. The Apple IIc, though ripe and juicy, had been bitten in advance by press releases; sticky fingers had already touched the screen of the HP-150 (no saucy jokes here, please); IBM had no fresh produce; and the Cat, trying hard to look as though it really had swallowed the mouse, was old hat.

Of the few new items on the menu, a large percentage were half-baked: "Yes, there's some new accounting software for the Commodore 64 ... well, it's not here yet. No, we can't show you any brochures." Just goes to show how hard it is to keep a few tasty surprises in the pantry when there are so many of these occasions to cater for.

The decor was tutti frutti, bubble-and-squeak and combination chow mein, all reheated from the PC Show, and tossed together to give the somewhat biting flavour of too many competitors each trying to put the most tempting seasoning into the broth.

Attendance

Despite the gaudy presentation, about 26,000 peckish, mainly business-oriented visitors wound their way past the 101 stalls, sampling selectively and sometimes making a meal of it.

Most exhibitors were pleased with

the response, and like prim hostesses, said they were glad the children had been left at home. Garry Swalling of Canon seemed to voice the opinion of many when he said, "We're in business, we're in debit and credit, and this is the type of show we want to be at."

Never Seen Before

Of the fresh, crisp and crunchy morsels, the Hewlett-Packard Thinkjet printers were probably the most interesting. The range features disposable ink-jet printheads which are made up of a liquid ink supply and twelve microscopic nozzles. Each nozzle can supply a drop of ink on demand from the printer as the printhead scans across the paper. These printheads are expected to cost under \$12 each, for which sum you will be able to print around 500 pages of text; this works out cheaper than the typewriter ribbon needed to produce the same amount.

The Thinkjet printers can be bought to interface with HP computers, HP calculators and portable computers, and non-HP computers such as the IBM-PC, Compaq, Texas Instruments and Apple II. They print at 150 characters per second (about 1300 words a minute), weigh from 2.4 to 3.4 kg, and accept fanfold or single-

sheet paper in A4 or 21.5 by 28 cm (8.5 by 11 inch) sizes.

Graphic resolution for the Thinkjet printers allows either 96 by 96 dots per inch or 192 by 96 dots per inch. The HP 2225B can operate as a portable (when used with calculators and portable HP computers), and uses a NiCad rechargeable battery pack which will print 200 pages of normal type on one charge. The cost of these new HP titbits (when they're ready for picking) will be around \$828.

Also still in the oven at HP is the Nomad briefcase computer. This little concoction is battery operated, runs 9 cm disks, has a 16-line liquid crystal display, and is said to be able to use all the software designed for the HP-150.

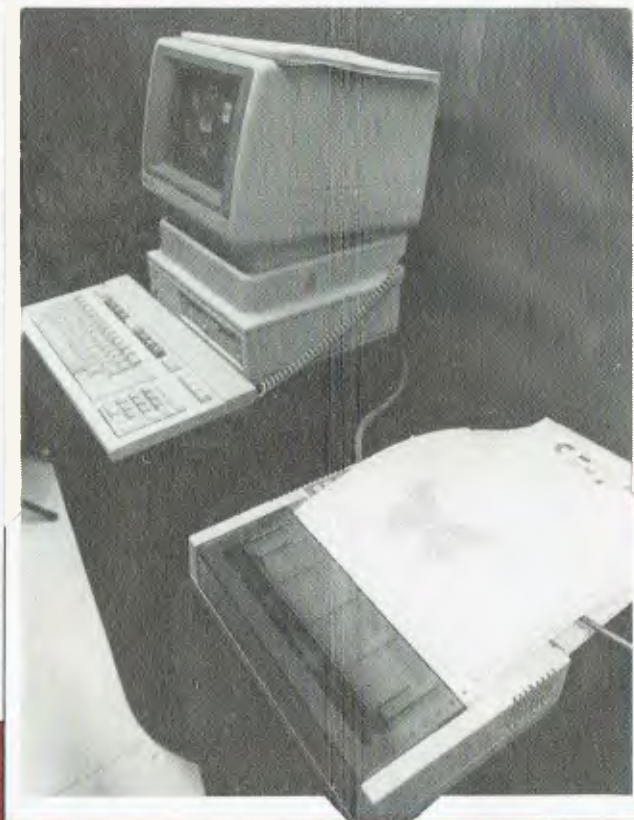
Nerve Jangle

Commodore tried to distract diners from the slightly underdone texture of its accounting software for the Commodore 64 by playing a little mood music. The first two lines of the 'Are you keeping up' jingle, played continuously, gave surrounding purveyors acute indigestion. The promised software includes general ledger, stock control, creditors, debtors and invoicing/sales analysis packages, each of which will cost \$100.



Above: Interior Modular Products isn't suggesting this is how you'll end up if you don't respect ergonomics, merely displaying correct skeletal posture!

Right: Hewlett-Packard's Thinkjet printer hooked up to an HP-150 Touchscreen computer.



IBM-PC compatibles were like French onion dip when it first became a party fad – hard to avoid. They included the Emtek-PC, the Eagle, the Compaq, and the Televideo and Corona ranges.

The prize for the most amazing takeaway packaging had to go to Colecovision. The Adam expansion kit for owners of the Colecovision games machine included a memory console, Smartwriter printer and keyboard, all in an enormous multi-coloured box which looked very much as if it contained one of those things that slices, dices, chops, grates, mixes, purees, juices and separates.

Computer Comfort

A large number of exhibitors were showing a tendency to care more for the posture of their customers. Not only were companies like Interior Modular Products showing a range of healthy but still appetising furniture, but many of the computer vendors were also displaying their products on ergonomically designed tables.

A sprinkling of stands offering courses in the use of both hardware and software were appreciated by most attendees. Deloitte, Haskins and Sells, an international firm of chartered accountants, runs introductory and advanced training courses in the use

of programs such as Multiplan, Lotus 1-2-3 and dBase II. They will also help you cook up accounting systems specifically suited to your business, with these popular packages as the main ingredients.

Arthur Young self-teaching video packages are also available for users of Visicalc, Multiplan and Lotus 1-2-3; and the Stamford College Group is offering six-month home study courses in Business Computing, Methods and Systems, Advanced Methods and Systems, and Computer Programming.

In these days of uncertain laws governing software, and of vast amounts of important and classified information being stored on disks, there was a preoccupation at Data '84 with keeping unwanted hands out of the cookie jar. Communication Control was selling its Prolok system for software producers. Prolok disks are customised with a unique fingerprint which is invisible to the legitimate user, but prevents unauthorised copying. For those who find themselves storing an increasing volume of confidential company information on disk, companies like Wilbropoint & Computer Supplies were offering secure storage systems, from lockable file boxes to safes designed to protect disks from both theft and fire.

On the Periphery

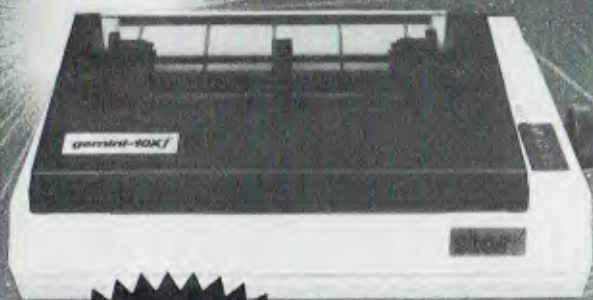
Another interesting side dish which we hadn't heard of before was Kwikasair's computer delivery service. The company claims to offer premium transit times, premium space allocation, a packaging service, pneumatic load control and air-ride suspension linehaulers when transporting your computer load. The cost is calculated on how far the PC(s) have to travel, how much room they take (in cubic metres) and how fast you want them to get there.

Nashua's data conversion service, which copies data from 20 cm disks onto 13 cm disks and vice versa, had nothing to do with food at all, but was nonetheless regarded as a tasteful addition to the computing world.

NEC's new Astra-Phacs phone accounting system, available through NEC's communications division or through Telecom, keeps track of the cost of calls made from different company extensions. It can generate reports on call details by extension; give call summaries by department, division or corporation, and generally allow you to keep track of things in order to make your use of phones more cost-efficient.

As is usual when covering such events it was hard to take everything in, but we tried. Gulp.

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WELCOME TO the new BBC column. I've got three topics for you this month: speed, education and the * commands. In coming months we'll be looking into some of the joys of networks, and at ROM-based software.

Speed

The BBC has never been accused of being a slow machine, but there'll always be a need to make it go faster. There is a section in the User Guide which suggests ways of speeding up programs, but don't take it too seriously; a few experiments will show that some of these suggestions are misleading.

You should certainly use system variables A% to Z% as loop counters. They will at least halve the time spent counting loops with real variables. Dropping the variable from the 'Next' statement will speed things up another five per cent. 'Repeat ... Until' loops are about three times slower than 'For ... Next' loops and should be avoided in parts of a program that are vital to execution speed.

So far the User Guide seems correct, but when it comes to choosing between Procedures or Gosubs, things get very confused.

Procedures are slower than Gosubs, and attaching parameters will slow them down even further. Calling one with no parameters (for example PROCName) and using global variables to carry data between the main program and the procedure executes about 20 per cent slower than a GOSUB, contradicting the User Guide's claim. Things get even worse when you start using parameters: calls such as PROCName (A%, N%) or PROCName(N\$) will take three times longer.

More experiments will show that the comments about ordering integer and real arithmetic on one line (on p.195) are incorrect most of the time, but only by about 0.1 per cent, so it hardly seems to matter. The claim that 'Repeat ... Until' loops are much faster than using 'If ... Then' needs checking, too; I found it only one per cent faster in several applications.

The moral seems to be that you have to decide which is more important: readability or pure speed. Personally, I'd go for readability every time speed wasn't of absolute importance.

Educational Software

It's always perplexed me to hear the claim that there isn't much good educa-

tional software around for the Beeb: UK magazines are full of advertisements for all kinds of software, which ranges in quality from mediocre to inspiring. More interesting is the fact that most of the educational material isn't listed outside professional magazines. A colleague recently returned from the UK with a list of Muse software for the BBC, which ran to 12 pages. Another source of good material is MEP. Write to MEP at Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne, for details, or contact Barson Computers here (86-88 Nicholson Street, Abbotsford 3067; phone (03) 419-3033).

In Australia, Jacaranda Wiley has published a series of well-designed activities for introducing map reading skills to primary children. Their release has brought a new level of professionalism to the publishing of educational software in Australia; schools may purchase their software on approval.

Using * Commands from BASIC

Occasionally you need to send * (Operating System) commands with a BASIC variable attached to them, from within BASIC programs. The part of the operating system that deals with * commands is the Command Line Interpreter at &FFF7 and, particularly in BASIC 1, it isn't up to coping with anything too much out of the ordinary.

One application would be to * SAVE a part of memory named in the course of a BASIC program, for example a screen. The command needed is:

* SAVE <filename> 3000 + 5000.

There are a number of ways to get around this. One approach is to use MID\$ to extract each character in turn from a string and pass it to an OS-BYTE(&FFF4) call with Y% containing the ASCII code for the character, X% = 0 and A% = 138.

Less comprehensible, but more elegant, is to call &FFF7. Let's say we're saving a picture from the screen under a filename held in N\$. First, set aside a bit of memory big enough to store the longest string one is likely to need: usually 32 characters is more than enough.

```
1000 REM Routine to save a Mode 2 screen.
1010 REM Filename is in N$.
1020 OSCLI=&FFF7
      : REM Address of Command Line
      : Interpreter.
1030 DIM Sp 32
      : REM Set aside space for the string.
1040 REM
      : Use indirection operator to load
      : memory space with command.
1050 $Sp="SAVE "+N$+" "+3000+5000"
      : REM Omit the *
1060 REM Now put address of Sp into X% and Y%.
1070 X%=Sp MOD 256 : Y%=Sp DIV 256
1080 CALL OSCLI
```

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JUST WHEN I thought the Vic had been totally forgotten by Australian dealers, Dolphin Computers arrived on my doorstep waving around some amazing new add-ons.

I managed to drag my dusty Vic out from under several other redundant objects and brought it to life for long enough to be suitably impressed by what I saw.

The Currah voice synthesiser has been around for a while, though not in great numbers. A robot-like voice commands your attention through your normal television speaker. The synthesiser plugs into the expansion port and is situated from \$A000 to \$A7FF. That means it will conflict with some cartridges, but, not to worry, this one alone will probably be enough to keep you busy.

Speech may be produced in several ways. At first, each keystroke is spoken as it would be if you said the key. This option may be toggled with a phonetic echo instead, so that each key is repeated how it sounds.

Words are sent to the synthesiser using these phonetic sounds to produce complete words. The quality is very good, though at times the voice sounds like it has to try very hard to get out what it has to say.

The Currah voice synthesiser sells for \$66.50. Dolphin also has a new three-slot expansion unit with DIP switches and a ROM socket. Very sturdy construction and pleasant styling would have to rate it as the best one I've seen to date. It's a pity it wasn't out a few months back.

A programmer's aid ROM may be inserted into the spare socket, and the expansion port is reproduced at the rear of the board. Expanding along these lines will cost you \$65. The programmer's aid is \$32 as a ROM chip or \$47 as a cartridge. It offers a wide range of useful utility commands, such as 'Re-number', 'Dump', 'Trace', 'Edit' and 'Resume', plus colour and cursor commands.

More Games

Did I say more games? Yes, Dolphin Computers also had some new games from the UK. Apparently we will see a lot more from over that way in the future. A few from Bug Byte, to whet our appetites, included Scramble, Cosmiads and Panic (based on an Apple program).

They all featured the usual jerky character animation, with explosions that left a lot to be desired. Nonetheless, they were as good as you can expect for \$19.95.

64 Tips

Many of you may already know of a common SYS command used to 'Reset' your computer when you're in a messy situation. The one to remember is SYS 64738. This actually causes the 64 to jump to the same routine it normally executes when you first turn on your computer.

Here is another which is very similar, except that some of the routines normally executed are bypassed. Try this one after you've changed the border and background colour to suit your own tastes.

SYS 64747 ... (a few bytes ahead of 64738)

Easy Fun

Feel like a little music? Owners of the early versions of Easy Script should try typing the following for a soothing surprise.

'F1'— CTRL 3.

Amazing what programmers will add when they've got a little spare time and space.

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FIRST, a correction. In my February article on assembly language a line of text was omitted which in this case gave an entirely erroneous statement. Wadsworth's *Z80 Instruction Handbook*, published by Hayden, is available from McGill's in Elizabeth Street, Melbourne, and other bookshops (although the supply from America seems alarmingly short). The Assembly Language Toolkit containing DEBUG and ROM manuals is available from Micro 80, 433 Morphett St, Adelaide.

Replacement For Scripsit?

The updated and improved version of 'Zorloff', now called 'LeScript', has had good reviews from a number of users of my acquaintance. While many of the new capabilities and features seem of little value to my particular use, what is attractive is the ability to merge names from a separate data file, so one can send the same letter to a number of people, with changes in the text as well as in their individual name and address. This is the same feature embodied in Profile 3+, for use on the Model 3 with SuperScripsit, but LeScript turned out to be much cheaper. Of course both SuperScripsit and Profile do many other things, but it was this very facility that attracted me and made me think of changing from my much valued Scripsit.

So I set about finding out how much LeScript would cost and where I could get it. I looked at the advertisements in *80micro* (an American specialist TRS magazine) and found it is sold by the original software house for \$130, but is available from one of the discount software houses for \$110. I then found it costs \$208 if bought from the Australian agent. Now I'm aware there are costs in importing software in a business situation, and that customs duty may be payable, and a whole lot of other considerations. But I couldn't help wondering if this were just another case of the local agent taking advantage of the average Australian's reluctance to send overseas direct. Or perhaps the 'agent' is not an agent, receives no agent's discount, so has to put his margin on top of the imported price?

All I'm saying is to observe the oft-quoted warning, 'Let the buyer beware'.

Improvement

For the past few months the quality of the content of *80micro* has been de-

teriorating. Now I'm pleased to be able to report that, following the change in ownership, it seems to be on the upward path again. While there is still a way to go to reach its former standard, at least the movement is there. So I consider it again one of the few specialist TRS magazines worth buying regularly.

Toy Computers

Now the price of the more 'serious' Tandy models has come down to a more affordable level, I can see no reason for the business user to force himself to get by with what I'd class as hobbyist computers: the Model 1s, System 80s and so on. I have a Model 1, but I would not contemplate using it in my business. In 1978 there was no other realistic choice, but today there is.

The reason I mention this is because of the number of inquiries I've received from readers who seem to be in just this area. Not that I expect them to sell their whole system. I'm aware, though, that quite a few readers use this magazine as a fount of general knowledge before buying something. So what I'm saying is you should consider whether the secondhand and/or 'cheap' unit is really a bargain if bought for 'serious' use — where loss of data is indeed serious and means loss of money.

Assistance

While on the subject of people who write to me for assistance, a large number seem to have a System 80 and/or are running NEWDOS. I can't suggest any general answer to problems with the combination. The obvious thing is to try a different DOS, or see if the same problem exists on a Model 1.

I've previously mentioned John Ross as a source of assistance for System 80ers. He is even more relevant now that Dick has stopped support, and the interest and use of modems and communications via telephone lines is growing. The problem with System 80s and terminal programs is that Model 1 uses different ports for the RS232, so either a new terminal program is needed (and I've not heard any user reports of those advertised as being specifically for the System 80) or the program or interface needs to be modified. Because of the critical timing involved with receiving data (and to a lesser degree with sending it) I understand few are bold enough to attempt program modifications them-

selves. John does have an RS232 to convert the System 80 output so it looks like Model 1, which then allows you a free choice of the excellent Model 1 terminal programs such as Telecom and Modem 80. He also has a number of other hardware modifications for both System 80 and Model 1, as well as cheap expansion interface and printer cable for the System 80.

John will also undertake modifications of the 'standard' programs (EDTASM+, Scripsit, MON3 and so on) that are definitely necessary for the System 80 to use what are actually Model 1 programs. John's new address is: 2-B Green Road, Woodville 5011, (08) 45 6332. Please send at least the return postage with your inquiry; while John does these modifications as a hobby, he (in my opinion) does not charge nearly enough and will be out of pocket if you don't.

Another source of assistance is Ian Robertson at 22 Hilary Crescent, Modbury North 5092, (08) 263-0653. Ian's expertise is with Scripsit modifications for System 80s, stringy floppies and printers. Because there are so many different printers with so many differing facilities, and just as many requests from their owners, Ian has to virtually custom-write each printer driver. So you can expect it to cost up to \$30, but write first. Again, Ian does it as a hobby, so please enclose return postage.

When you send a program to either John or Ian they will apply the patch to your own program, not just give you a new version without the other patches you may already have installed. But it's a good idea to mention such patches in case any of your required customisations conflict.

When you're writing to me, either for assistance, or for a copy of The Adelaide User Group's newsletter, also include a stamp. Otherwise I'll wait until the next bulk mailing, which could make you think I've ignored you.

MON 3 Printing

The first release of Mon 3 (the monitor I have and still do recommend) came with only a single sheet list of the commands. The author claimed he'd send the full manual as soon as it was prepared, but mine never arrived — though later purchasers did get a quite comprehensive (photocopied) manual. One

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Printing direction: Dot graphics density up to 1280 dots per line.

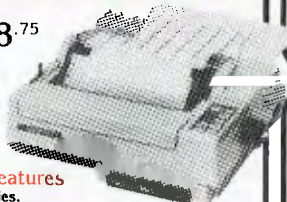
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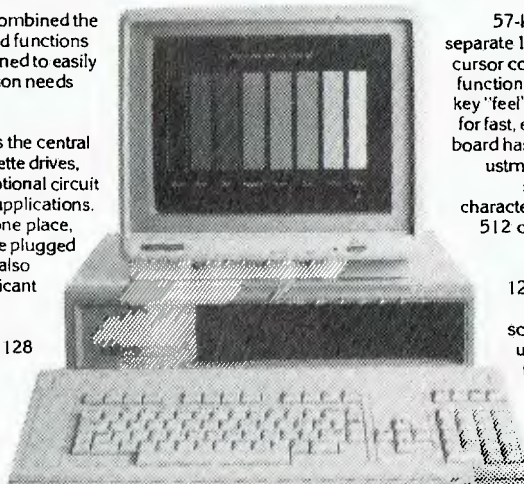
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of the things missing from the initial sheet was the documentation of the printing facility. Most of the commands (of course not such things as loading a tape) can be sent to the printer as well as the screen. I've seen two versions (there may be more): one uses shift P, the other uses the down arrow instead of Enter after putting in the information required. A simple trial will determine which version you have. If you can't get either to work, disassemble the program and look for a message about the printer. Then contact John Ross to modify it to work on your System 80.

More Back-ups

After my somewhat extended plea for making back-ups in March, I feel I should report two of the results of readers contacting me and disputing any such need.

Both people use their systems in the business world, which is probably even more relevant to my assertion that it can

be embarrassing to lose data. Consider the loss of face if you had to ask every one of your customers if you sold them anything last month because you've lost all your records?

One fellow who has never made back-ups delighted me by phoning to say he was beginning to think there might be something in what I say, because he'd just lost four days' work in entering data. I was pleased not that he'd lost it (even I'm not that smug), but that he should tell me. At least in his case the source was still available.

The other case still has me wondering. These days most typesetting is done on computerised typesetters, and is stored on diskette. Even though some (not all) models have two disk drives, it seems a common practice not to bother with backing up. In a rather lengthy discussion with one of these practitioners I was told that these machines (costing \$100,000 in many installations) are much more reliable than our systems,

and have protection against such things as power failures or disturbances. In eight years of daily work the fellow had lost only five diskettes, so the economics of the situation were against the cost of diskettes and the time it takes to back-up. The difference I see is that it will only be time that is lost here, as opposed to un-recoverable information in (for example) an accounting situation. Perhaps Our Editor or Our Typesetter will venture an opinion here?

Your beloved, efficient, obliging, reasonable, long-suffering Typesetter would like to venture the information that he always backs up copy at the typesetting end when he keyboards it in, when requested or when the job is complex, unusual, or interestingly formatted. He also backs it up at his computer end if he has converted it from disk. He would willingly back everything up at his computer end if he had the facility to transmit from the

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typesetter back to the computer. He is discouraged from backing up everything at the typesetting end by economics. The gentlemen (I use the word ironically) providing the 20 cm floppies formatted for the typesetter rip us off to the tune of \$27.50 per floppy (a rise from \$17.50 during the past two years). I am a continuously protesting victim of such highway robbery, but to no avail. Because of my fiercely competitive prices and the tardiness of some customers in paying their bills – Your Computer very much the exception – I find it necessary to limit the number of floppies I buy at this exorbitant price, and distasteful to deal with pirates.

Thank you, Mr Murray (our long-suffering typesetter) – glad we're still friends!

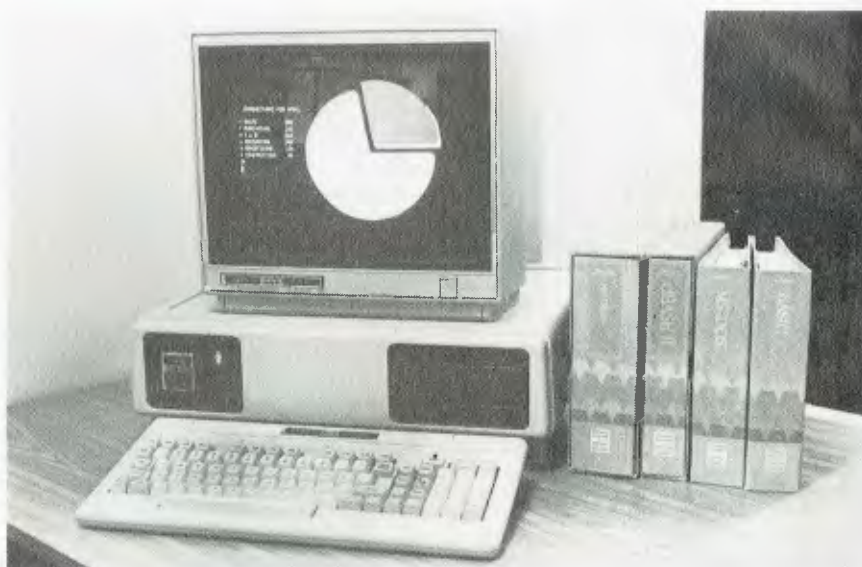
Hardware Back-ups

After pondering the situation of something happening to my beloved Model 1, I decided the actual keys are the only parts not readily replaceable from standard sources. So I inquired at the local Tandy Computer Centre as to the cost of a whole replacement keyboard (that is, just the PC board with the keys, not the whole CPU box), and found they wanted just under \$110. So I decided this was reasonably cheap insurance for my whole system. Alas, when it arrived they informed me they now wanted \$170. Even though the staff seems to be constantly changing in my particular local Computer Centre, it appears what matters more than customer satisfaction and good relations brought about by staff and organisational efficiency is sales figures. I've had enough letters expressing dissatisfaction to know this store is not an isolated case, and Tandy's sales success is despite the sales personnel.

So now I'll do as others have and look about for a cheap second hand unit to use for spare parts. There are some non-working keyboards advertised in the daily papers and the computer magazines. So if you too have a fully expanded system, it may be worth considering if this is worthwhile insurance.

Which DOS?

Regular readers will know my preference for LDOS, though I can understand some may find it a little heavy going at the start. A less complex DOS is



Tandy's new Model 2000, reviewed on page 51 of this issue.

DOSPLUS, and though it doesn't have as many features as LDOS, it is certainly far in advance of TRSDOS, which has since been abandoned by Tandy for LDOS.

On a different track altogether is NEWDOS, which has purposely chosen to go down a different road from TRSDOS and therefore lose a lot in compatibility. The rumours continue that Apparat will cease support for NEWDOS, and will not be releasing a newer version.

One thing I particularly appreciate with LDOS is its patches (supplied 'free' with the DOS) for other programs which need changes to run under LDOS. It seems to me that if the DOS is the reason why a program won't run, it should be the DOS maker who supplies the patches. It's not realistic, to my way of thinking, to expect the writer of a program to provide a version to run under every DOS on the market.

General Reading

When I'm asked for a source of general reading in a magazine, I recommend the American (not the British) *Personal Computing*. It is not machine specific, but reports general news and trends as well as articles on particular topics. It could probably be loosely termed as the American equivalent of YC; there's no incestuous tie-up involved, it's just that as this magazine reflects the Australian scene, American *Personal Computing* reflects the American scene.

Don't be an Island

A big benefit of knowing others within the local users' group is to be able to 'bounce' ideas around, and get another's view of a problem. I recently had an experience of this in a phone call from an extremely competent professional calling STD from Sydney, who had a problem with four lines of assembly code and needed another to look at it. I suppose there's less loss of face if you don't do it locally, but I for one don't mind asking. You'll probably find it's a two-way exercise unless you come across that unique individual who never makes silly mistakes.

Don't be Hasty

At the moment I'm writing this with tape Scrispit (of course) because my disk controller doesn't want to work. My point is that I'm glad I'm not like the many who've thrown out their cassette machine, and recorded music over their tape programs – for then you wouldn't get my column this month. Similarly, with any non-standard system (and tape is the only standard system) such as fast-tapes, stringy floppies and so on, I suggest you keep a standard version of your programs and data to guard against certain failure of something one day. While I could certainly contact another member of my local users' group and possibly borrow something, I feel it's far better to be self-sufficient in this regard. But when I do need help, the group is there. □

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HELLO AGAIN. This month I will be continuing our guided tour of the 99/4A Home Computer System, with a closer look at the disk drives, printers, joysticks, monitors and communications devices available. I have also received some exciting new software – from local sources and from the United States, in both tape and cartridge formats – which I will share with you.

But first to answer some readers' letters. Mr David Ritson of Campbell in the ACT asks where he might find some magazines with more information and programs for the 99/4A Home Computer. Well, besides *Your Computer*, there are three I can recommend. They are *Computer and Video Games*, published by EMAP National Publications in London; *Home Computer Magazine*, published by Emerald Hill Publishing Co in the USA; and *Enthusiast '99*, the official publication of the International 99/4 Users' Group. *Enthusiast '99* is free to all members of the International 99/4 Users' Group (address in April issue of *Your Computer*), and is published bi-monthly.

Mr CHF Hurst of Earlville, Cairns, has asked for more information on peripheral equipment not manufactured by Texas Instruments. This is a tricky topic since according to TI any internal equipment adjustments or additions used in conjunction with the 99/4A will void the user's 12-month warranty. I do know of a number of people using Dick Smith drives, various types of printers (Case, Microline, C.Itoh and Olivetti), Cicada 300 modems and numerous Atari-type joysticks with adapters – but apart from these items, little else has come to my notice. If there are any 99/4A users who have used non-standard equipment I would be very pleased to hear from them, as I am sure such information would be of benefit to everyone in the long run.

Thank you to those people who took the time to communicate with me and I hope this column will flourish as a result.

A Guided Tour – Part II

After setting up your 99/4A Home Computer and using it for some time, you may wish to add one or more disk drives (the 99/4A accepts up to three); add a printer for 'hard copy'; access some of the bulletin board services that currently abound in Australia (for example MI-CC and Public Access); or you may

have worn out your old TI joysticks and wish for something a little more robust. Well, read on and perhaps you'll find the answer to your questions.

The disk memory system requires a disk drive controller card mounted inside the peripheral expansion box, and at least one disk drive. A further two drives may be added outboard, if more serious word processing or business work is undertaken. There is an alternative to this system: if greater storage is necessary a double-sided disk system can be used. A number of small companies in Melbourne are currently offering such a system (see *Softex*, an independent magazine published for 99/4A users by members of the Melbourne Users' Group). Also, an American company, Percom Data Corporation, offers a self-contained add-on drive for US\$389. It is single-sided, single-density with 92 Kbytes of formatted storage. A peripheral expansion box or disk controller card is not needed. It plugs directly into the console on the right side.

Many computer users have not fully appreciated the business applications to which the 99/4A can be put. Word processing (like that which I'm using to write this article), Microsoft Multiplan and even CP/M-80 2.2 are all available for the 99/4A. The well respected Digital Research CP/M system comes on a card that fits neatly into the peripheral expansion box, complete with its own 5 MHz 8085 CPU, 64K RAM, 8K ROM and a users' guide. It is available from Morning Star Software, 4325 SW 109TH Ave, Beaverton, Oregon, USA 97005 – for US\$595. This gives the user access to many business programs which can be downloaded from CP/M bulletin boards through modem connection. All you need is to join a club such as MI-CC for access. Other small business-orientated software packages include databases, accounting packages and financial forecasting (currently available from Computerwave, George Street, Sydney).

When looking at printers, the 'peripheral jungle' becomes even more confusing, since there is such a bewildering array of printing units available; from 'thermal-type' to letter-quality typewriters with interface cables. First, you need an RS232C/P10 device. This can either be a card for the peripheral expansion box or a 'stand-alone' unit (I know of at least one group of users here

in Sydney with such a unit under construction) which connects in daisy-chain fashion to the right hand port on the 99/4A console. The advantage of the RS232C card is it also has a parallel port (PIO) which allows for a more convenient transfer of data. This lets you buy an RS232C-compatible printer or a Centronics-type parallel printer. Those of us using modem communication are able to use the PIO port for printer duties, leaving the RS232C port free for connecting the modem.

The difference between serial and parallel printers is in the method of transfer of information. The computer tells the printer what character to print by sending it eight bits of data. In the serial format each bit follows the other to the printer, while in parallel all eight bits travel at the same time along eight separate wires. Obviously parallel methods are capable of much faster transfers, but this difference is not significant in comparison with the speed capabilities of printers sold nowadays.

Printers are usually classified according to their performance in speed and quality of print, and many carry product names incorporating these performance characteristics. Common printers are either dot matrix or daisywheel. Dot matrix printers are very fast and form their characters as arrays of tiny dots; while daisywheel printers are usually slower in comparison, but the type is indistinguishable from an expensive typewriter.

So which one do you buy? As a rule if you require high speed output or if you wish to 'dump' graphics, dot matrix is for you. If you need a high quality letter writer, a daisywheel printer would be your choice.

One other aspect you might like to bear in mind when shopping for a printer is whether you will need friction feeding as well as tractor or pin feeding. The traditional typewriter uses friction feeding to roll the paper through the carriage. This feature is also available on many printers. It is an advantage when using specially printed office stationery or other single sheets. Tractor feed uses computer paper which can be purchased in large quantities (for example, 5000 sheets), and it has sprocket holes in perforated edges that can be torn off after use. These holes position the paper in the printer.

Both dot matrix and daisywheel are what we call impact printers; that is,

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words and symbols are formed by pressing an inked ribbon against plain paper in the required pattern. Another method is thermal printing. Here, the printing element contains tiny dots which are selectively heated as the element passes over paper that is thermally sensitive. This produces permanently darkened spots at those points where the element was hot. Thermal printers require special paper that sometimes yellows with age, but their two main advantages are quietness of operation and relatively cheaper price.

Finally, a brief word about television sets, monitors and joysticks. An ordinary TV set is fine for the average computer user who doesn't need 80-column screens for business use. As a matter of interest, the display from the 99/4A was recently voted as being the best yet seen on a commercially available home computer here in Australia.

There are two types of RF modulator available for the 99/4A: UHF or VHF. There has been some speculation that the picture quality of one is better than the other. I have compared them and couldn't see any such difference. The UHF modulator is tuned to channel 36 and the VHF to channel 4 (not channel 1 as indicated on some of the latest shipments). If you are using an old black and white TV, you may need to buy a special adapter called a balun to connect your modulator cable to the screw terminals on the back of your TV. These are available at electrical stores for about \$2 (Dick Smith Cat. L-4454).

A monitor is similar to a TV, but it doesn't have a tuner. The image produced on a monitor (colour, amber or green) is not processed by any adapters or tuners and is of a superior quality. It can also handle 80 columns without straining the eyes. The only disadvantage is you can't watch TV while waiting for that long program to load from your tape deck.

Many people have found the joysticks supplied by TI to be poor performers when it came to the test (for example, games like Parsec and Munchman), but my experience has been that there are few controllers which can handle the speed of either of these games. I prefer the keyboard cursor keys. If you are looking for an alternative, try some Atari-type controllers with a special adapter. I have been using a double-adapter from Beckenham Computing Services (phone (02) 522 9386), but I'm not sure

whether the company is still in business. Alternatives are available from Computerwave in Sydney (double type), or Waltons in Parramatta (single type). The double costs around \$25, the single around \$10. You can connect such exotic units as the Wico Red Ball, but expect to pay at least \$45 - \$50 each for them. Munchman will still elude you, but these joysticks work well on almost everything else - including Donkey Kong and TI Invaders.

I have some new software from the US and I am pleased to be able to review it for those readers also taking the mail order plunge. Be prepared, however, to pay some customs duty if you order more than one item. This usually amounts to about A\$6 to A\$10 for two items. I personally feel that the quality and price of software available in the United States is worth this minor hassle and other people I have spoken to agree.

Burgertime Review

Burgertime comes on ROM cartridge from Texas Instruments, which licensed it from Dataeast USA. It starts with a simple black and white title screen asking the user to 'press any key to begin'. The action starts immediately with four characters: Mr Hotdog, Mr Pickle, Mr Egg and you, Chef Peter Pepper.

This game takes key elements from several popular arcade games and fuses them into what I think is one of the most addictive games I have played since Munchman. Here we have the climbing action of Donkey Kong, the evasive skills needed in Munchman and the smooth, high resolution graphics of Parsec. Burgertime is itself an adaptation of a very popular arcade game.

As Pete Pepper, you are in charge of a kitchen in which several of the food items have gone out of control - they want to prevent you from doing your work of making hamburgers. The villains can only be avoided by walking and climbing around the kitchen, by snuffing them out with your pepper shaker, or by squashing them under burger layers (for extra points). You begin the game with five chefs and each successful screen completes four burgers. You may not advance to the next screen until all four burgers are completed with bun, salad and meat. There are six patterns for each kitchen, which increase in difficulty. Extra pepper shakers are awarded when you cross the ice-cream cone in

the top-centre of the kitchen. Believe me, these are necessary if you want to survive the higher levels of play. I have managed to reach level two, with a score just over 12000. If you can beat this score please let me know - I'm curious to see what happens on higher levels.

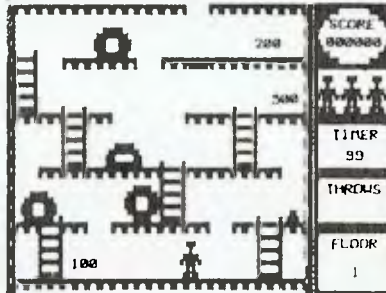
Points are awarded as follows: extra chef every 10000 points; burger layers earn 50 points for each level they fall; and snuffing Mr Hot Dog brings 100 points, Mr Pickle 200 points and Mr Egg 300 points. Ice-cream is worth one extra pepper shake plus 300 points, and coffee is also worth one more pepper plus 1000 points. Burgertime also features a 'game pause' option, as well as a choice of joystick or keyboard control.

The documentation supplied is imaginatively presented, thorough and easily understood - definitely a plus for TI.

Well, that's all for this month. I hope to be able to devote the majority of the next column to reviews of software and books. ☐

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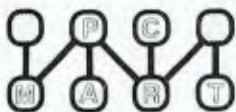
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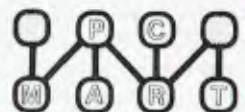


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THERE ISN'T a lot of published material which shows how to use some of the newer and more sophisticated facilities of high performance operating systems like Concurrent CP/M-86 and MP/M-86. Most of the programmers who are good at programming in these environments are quietly sitting on that knowledge and not spreading it around, because they see it as commercially valuable. The same seems to apply to MSDOS, and so on.

In the hope of shedding some light on the subject, here is a utility I recently wrote for CCP/M-86, which illustrates how to use one of the extended BDOS calls and how to manipulate process descriptors.

The utility, called U.CMD, allows changing the drive and user area with one command. Those of you who are CP/M 2.2 hackers may be wondering what all the fuss is about, since it is easy to achieve this under CP/M 2.2 — but CCP/M does things differently ...

Processes

Many of you may not be familiar with the term 'process', which is used a lot in the following explanation of U.CMD. In single user operating environments it is common to talk in terms of 'programs' that are executed by the user. In multi-user environments it is better to think of 'tasks' which are executed by the user. A 'task' will be comprised of a number of 'processes' which actually implement that 'task'.

Theory of Operation

As the significance of the extended BDOS functions in CCP/M-86 and MP/M-86 is not always well understood (even by those of us who should know better), here is a description of the mechanisms which caused this utility to be written and allow it to work.

In a CCP/M-86 or MP/M-86 environment, the Terminal Message Processor (TMP) is 'normally' the owning process for all user processes. That is, the TMP is like the CCP in a CP/M system and

initiates all user programs, *but* as CCP/M and MP/M are multi-tasking environments the TMP only temporarily passes control to the user process and expects to regain it when the user process terminates. The only circumstances under which this may not happen are if the user process itself initiates another process with a higher priority than the TMP, or if the user process 'chains' to another process.

One characteristic of one process initiating another is that it establishes a 'parent/child' relationship. The child process inherits its parent's drive and user number *and*, even if the child process changes the drive and user number during execution, when it terminates and control reverts to the parent, the parent's drive and user number are reasserted.

I have become accustomed to using a utility which allows me to change drive and user area simultaneously in a CP/M environment. I wanted to have the convenience of this utility in CCP/M-86 and MP/M-86 environments. The challenge was to find a way for a child process to alter its parent's drive and user number, so that when control reverted to the parent the parameters set by the child were asserted.

Process Descriptors

The solution lies with the process descriptor. The CCP/M-86 and MP/M-86 operating systems maintain a System Data Area (or SYSDAT) which contains Process Descriptors for all current processes. Among other entries in the process descriptor are the current drive and user number for that process, *and* the process descriptor address or 'offset' in the current SYSDAT segment of the process's parent process. The operating system provides a function call which will return the address of the process descriptor for the current process. From that, it is possible to determine the location of the parent process and go in and modify the drive and user numbers so that when control passes back to the

parent process, the parent asserts the drive and user numbers set by the child.

Note that this utility doesn't actually call the BDOS functions for setting drive or user area ... it doesn't need to. The operating system will pick up the values from the parent process descriptor and do all that tedious stuff for you when the parent process regains control.

Now all this works fine as long as you initiate U.CMD from the TMP, which is normally what you would do. That makes the TMP the parent process. If, however, you conspire to initiate U.CMD from some other process, it will simply change the drive and user area of that process, not the TMP! Presumably the only reason you would do this is because you have 'replaced' the TMP with another command processor, so the effect would still be the same. Anyway, the point is that the TMP drive and user area will only be changed if the TMP is the parent process — so don't say you weren't warned.

The utility is built using the 'small' memory model and uses the 96-byte stack provided by the operating system.

Availability

See page 121 for the listing of U.CMD. The source file for U.CMD, called U-CCPM.A86, is available for downloading from the Software Tools RCPM system and may be available on other RCPM systems by the time you read this.

DR FORTRAN

A few more details about the new DR FORTRAN 77 have become available. Major features are:

- Meets all ANSI X3.9 specifications for FORTRAN 77
- Supports 8087
- Arrays up to 65,536 elements
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- Subscript checking option
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- 40-character variable names

DR FORTRAN 77 is now due for release in early July.



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```

*****
*
*               U.A86
*
*               Selects user area and drive with one
*               one command for CCP/M-86 and MP/M-86
*
*****
;
;
;   By:      Bill Bolton
;           Software Tools RCPM
;
;   Software Tools RCPM uses CCITT V.21 standard, 300 bps modems
;
;   International      +61 7 378 9530
;   Australia         (07) 378 9530
;
;VERSION LIST, most recent version first
;
;29/Apr/84 Added version check, tightened code considerably
;           (isn't the 8086 instruction set wonderful when you
;           start to get the hang of it).
;           Version 1.1      Bill Bolton
;
;28/Apr/84 Initial implementation after the 'penny dropped' on
;           how to modify the TMP process descriptor in an MP/M
;           environment! Version 1.0      Bill Bolton
;
*****
;IMPLEMENTATION NOTES
;
;-----
;You should make this utility accessible from all drives and
;all user areas by putting it on your SYSDISK and setting the
;SYS and R/O attributes. You also have the option of restricting
;the maximum user area and of setting the maximum drive number
;that the program will select.
;
;This program should be GENCMDED with the following command line
;
;           GENCMD U               (simple isn't it)
;
;                                   Bill Bolton, 29/Apr/84
;
;-----
;This utility WILL NOT WORK with (single task) CP/M-86
;
;-----
VERS      EQU      1      ;Major version number
REV       EQU      1      ;Revision number
;
FALSE     EQU      0      ;1=2
TRUE      EQU      0FFFFH
;
FCB       EQU      5CH    ;Default file control block in data segment
;
C_WRTSTR  EQU      9      ;BDOS display string
S_BDOSVER EQU      12     ;BDOS return version number
PD_ADR    EQU      9CH    ;BDOS return process descriptor address
BDOS      EQU      224    ;BDOS software interrupt
;
TAB       EQU      9      ;ASCII tab character
LF        EQU      0AH    ;ASCII line feed character
CR        EQU      0DH    ;ASCII carriage return character
;
PDISK     EQU      12H    ;Offset to disk in process descriptor
PUSER     EQU      13H    ;Offset to user in process descriptor
PARENT    EQU      1EH    ;Offset to parent in process descriptor
;
MPM       EQU      11H    ;MP/M-86
MPMN      EQU      13H    ;MP/M-86 with networking (did it ever exist?)
CCPM      EQU      14H    ;CCP/M-86
CCPMN     EQU      16H    ;CCP/M-86 with networking (DR/Net)
;
;Set maximum parameters
;
MAXUSER   EQU      15     ;Maximum user area (in range 0-15)
NUMDRVS   EQU      6     ;Maximum drive number (in range 1-16)
;
;           CSEG
;
START:
MOV       CX,S_BDOSVER    ;Which OS are we under?
INT       BDOS
CMP       AH,MPM          ;MP/M-86?
JZ        OK
CMP       AH,MPMN         ;MP/M-86?
JZ        OK
CMP       AH,CCPM         ;CCP/M-86?
JZ        OK
CMP       AH,CCPMN        ;CCP/M-86?
JZ        OK
JMP       VERSION        ;Not multi-tasking, yell
;
OK:
MOV       BX,FCB+1        ;Point to 1st character of command
MOV       AL,BX
CMP       AL,' '
JNZ      DIGIT            ;No, process it
JMP       USAGE           ;Yes
;
DIGIT:
SUB       AL,'0'          ;In range for user number
JAE       DIGIT1          ;Yes
JMP       USAGE           ;No, not digit or drive specifier

```

END

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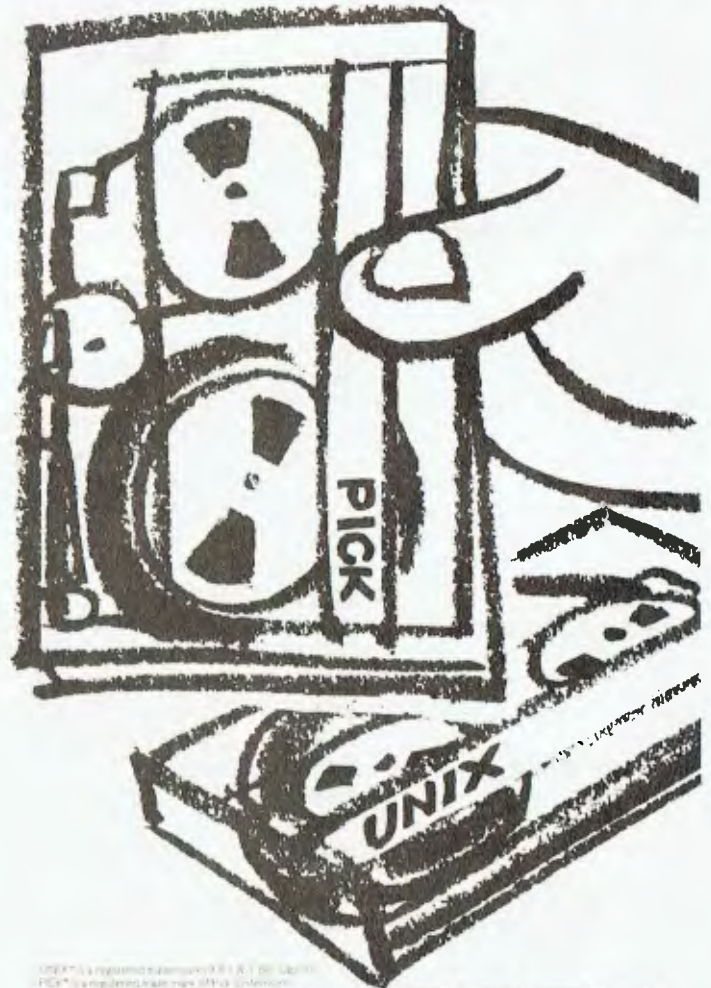
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Public Domain Software

At the time of writing (March '84) both the Melbourne PC User Group and the IBM-PC SA User's Group were distributing the PC/Blue public domain software to their members. Other groups being formed in Perth, Sydney and Canberra have also expressed an interest in the software. (Contact details for these new groups will be published when available.)

Late in '83, PC Connection Australia undertook to make the PC/Blue software available as a non-profit service until other channels of distribution were available. As the user groups are now providing the software, PC Connection Australia has withdrawn the service. If you haven't joined one of these user groups yet, I recommend you do so. Most groups provide access to a newsletter, meetings, and the public domain software.

PAMS News

There are two new systems to report on this month. Computer Ventures in Adelaide has a Bulletin Board System running. This is a commercial venture with an annual subscription. The CV-BBS does allow visitor access and that is probably the best way to get details of subscribing to the system.

Another Omen RTRS system is now on line. The Omen III system in Perth is running Peter McGrath's popular RTRS software. The OM3-RTRS is running on restricted hours at the moment.

I believe there should soon be at least two remote PC/MSDOS systems on-

line. The system in Melbourne will use IBBS software on an IBM-PC and will initially be a message only system. The Sydney system will be run by Dick Smith Electronics, to support their new 'Challenger PC-compatible', and will also use the IBBS software.

Anyone in Newcastle who is interested in seeing an RCPM system running there should get in touch with the Newcastle Microcomputer Club and ask them why they are taking so long to get their system going.

PAMS Numbers

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Software Tools RCPM (ST-RCPM) (07) 378 9530 24 hours EST.

Mi Computer Club BBS (MiCC-BBS) (02) 662 1686 24 hours EST.

Micro Design Lab RCPM (MDL-RCPM) (02) 663 0151 24 hours EST.

Sydney Public Access RCPM (SPA-RCPM) (02) 808 3536 24 hours EST.

Omen RTRS (OM-RTRS) (02) 498 2495 1630-0900 + 24 hours weekends.

Sydney TRS-80 UG RTRS (STRUG-RTRS) (02) 332 2494 24 hours EST.

Melbourne CBBS (MICOM-CBBS) (03) 762 5088 24 hours EST.

Sorcerer CBBS (SCUA CBBS) (03) 836 4616 24 hours EST.

Tardis RCPM (TARDIS-RCPM) (03) 67 7760 1800-0800 + 24 hours weekends.

Gippsland RCPM (GL-RCPM) (051) 34 1563 24 hours EST.

Adelaide Micro UG BBS (AMUG-BBS) (08) 271 2043 1000-2200 weekends only CST.

Computer Ventures BBS (CV-BBS) (08)

255 9146 24 hours CST.

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Software Tools RCPM

The Software Tools RCPM has acquired the first 40 volumes of the PC/Blue PCDOS public domain software (thanks Lloyd), and now has them available for downloading on request. PC/Blue is a public domain software collection for the IBM-PC, put out by SIG/M. These volumes include PC-Talk III, and a BASIC communications program that uses Christensen protocol.

A further nine volumes have arrived from the C User Group and are also available for downloading, on request. This brings the CUG collection up to 45 volumes. The new volumes include the Citadel BBS system, a Small C compiler and graphics system for the Tandy 6809 colour computer; a text editor; two text formatters; BDS C compiler utilities, and so on.

Several new SIG/M volumes have been released (up to at least volume 165) in the US and should be available by the time you read this. The CP/M User Group has managed to trickle out a few more volumes and is now up to volume 95.

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WELCOME again to the Atari column. For this month I've reviewed Bill Budge's Pinball Construction Set, but first I'll discuss the Source.

Straight from the Source

The Source is known as 'America's Information Utility'. It enables you to find out almost anything you wish to know, 24 hours a day (although it's sometimes down between 4 am and 6 am New York time), every day of the year. To join the Source costs US\$100, and you are asked to pay with an American Express card, a Visa card or a Mastercard; they aren't too keen on billing you direct.

It usually takes about a month to receive your password and user-name, which give you access to the system. You also receive the User's Manual and Command Guide. The manual discusses Source facilities at length, while the Command Guide simply lists all the commands. You are also kept up to date throughout the year by two monthly newsletters, 'SourceWorld' and 'Update'.

To obtain access to the Source you must have an account with OTC, through whose computers you are connected to Telenet and then the Source (it's not as complicated as it sounds). Write or phone OTC for more information on obtaining access to Telenet.

Once on-line – and after the brief intro which announces the time, when you were last on, and any urgent information or news (our winning the America's Cup was included in this bit) – you are confronted with the Source menu. Simply pick the number of the service you require, for example Personal or Business, or pick '6' which will lead you to the command level. Going straight to the command level bypasses a series of menus (usually only for the beginner) and allows you to enter commands directly – after the prompt (->), of course.

The services available through the Source are many and varied, and include: CHAT, for talking directly to other users; MAIL, for leaving messages for other users or groups of users; PARTI, for participation in a teleconference; and POST, to read or post messages in over 80 categories from Aircraft to Satellite TV, User Publishing to Zenith.

The news service is particularly powerful, and uses the resources of United Press International (UPI). News stories are very current (for example, the Amer-



ica's Cup news was 15 minutes behind the live coverage on television), and are numbered and dated for easy reference.

Businessmen can keep track of their stock holdings; access the latest quotes on any stocks; or find the latest prices of gold, silver and other commodities from butter to rubber and orange juice. Hourly reports are also available from both the American Stock Exchange and New York Stock Exchange. Updates are recorded hourly throughout the working week.

CSTORE opens up a new way of shopping from your computer terminal. Computer games, travel services (including an international airline timetable), restaurant guides (for the USA), and an ever-growing user publishing library, are a few of the other services available from the Source.

Perhaps the most interesting and potentially powerful item available is IOD (information on demand). This allows you to obtain bibliographies on any subject for research or study. It is claimed that IOD can "locate, photocopy, or acquire published information in any form from almost any country". This information includes things such as conference papers, journal articles and annual reports. It can also research any subject you require – the floor plans of Austrian hospitals, for example! An 'aware service' of IOD will keep you up to date on any changes in your specific field, providing current bibliographies on such things as competitors, product markets or research problems.

The IOD service is an added extra with an added extra cost, which varies in magnitude according to the complexity of the problem. It may be quite ex-

pensive, but you will get a response to a request within 24 hours.

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To change the shape of your field, grasp the arrow and place it on any of the dots in the corners of the field, press the button and move the joystick. The playing field moves out of shape (or into shape), until it gives the outline of your masterpiece.

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hoppers and eaters, magnets, lanes and rollovers, gates and targets in your creation, you can really let loose.

Go to the magnifier icon at the right-hand side of the parts box, and 'pick it up'. Move the paintbrush onto the playing field and press the button. That section of the playing field is now magnified seven times in the right-hand box. Press the button and move the paintbrush; the magnified image changes as you move over the different parts of the playing field. Moving the paintbrush over magnified areas will paint over them, and also over the actual object in the field. Using this method you can sign your name, block out bumpers (but really they're still there) – the possibilities are almost endless.

Then old Bill Budge lets you do some very sly things. For example, you can block out a bumper, and return to the main 'creating mode' to move the bumper (the invisible one) off the playing field. The image will return (the

negative of a negative is positive), but the bumper will not be there and any ball will pass through it.

The 'world' icon enables you to change the weight of the ball, its speed, and how much kick and bounce you have in your game.

The 'AND' gate is a bit complicated, but can be very powerful. It allows you to set the scoring of each piece (such as bumpers, targets and so on), and also the sound effect for that piece when hit.

In real pinball a major objective is to get bonuses, perhaps by dropping all rollover targets or by hitting a certain sequence of pieces. In PCS this is also possible.

Grab the screwdriver and connect the pieces (three may be connected to each other) to an 'AND' symbol. Choose the score you want. Now, if you hit all these pieces, you get a bonus of whatever you choose.

You can save your games, load

demons and games, or make games. Games can also be played independently of the master disk, which means you may create games for your friends who don't have the PCS – but I can guarantee they'll want one.

This game is excellent. Anybody who enjoys games, creating, art or even real pinball will get a lot of pleasure from it.

I'm not sure if it is available in Australia yet (it wasn't at the time of writing); contact Imagineering on (02) 212-1411 for details.

Adventure Special Interest Group

If anyone is interested in being part of an Adventure Special Interest Group, which will hopefully help lost adventurers as well as advise of any new adventures, please contact me and enclose an SSAE for more information. My address is:

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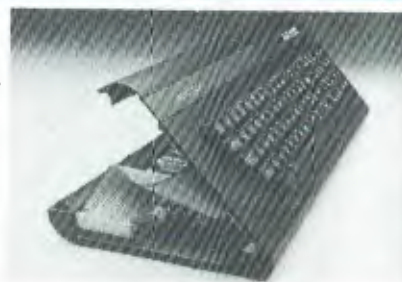
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Housed in the MTX's 24K ROM is MTX BASIC "Extended Basic", MTX GRAPHICS, MTX NODDY an 11-command "Easy Learn" Language for children, ie "LOGO" and MTX Assembler, enabling programming in assembly language. Assembler/Disassembler tied to basic provides keyboard access to Z80 CPU STORAGE locations memory and program PASCAL FORTH are also available in ROM packs.



Also, a numeric keypad, eight dual function keys. Abbreviated basic commands, built-in Syntax verifier. Automatic cursor-honing to errors, auto-line numbering and automatic scrolling.



The 160 MEGABYTE CONNECTION.

Unbelievable expandability. Z80A Processor running at 4MHZ. FDX Floppy disk system single and twin 500K disk drives operates in CPM 80 Version 2.2 MDX HARD DISK system, 10, 20 or 32 Megabytes. SDX SILICON DISK (256K). Dramatically increases the efficiency of proven eight bit CP/M SOFTWARE to the speed of 16/32 BIT SOFTWARE levels and greatly reduces disk wear.

SYSTEM provides up to 160 Megabytes of storage capacity via twin RS 232 C. NODE Software and OXFORD RING Communications Network which links 255 units.

WORD PROCESSING PACKAGE FROM ONLY \$1,199 (EX. TAX)

The package includes A MEMOTECH MTX 512. The powerful NEW WORD (TM) Professional word processing software in ROM CARTRIDGE PLUS A correspondence quality printer, exceptional value.

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There is one simple Equation for pricing, the more the engineering, the lower the cost.

MTX 500 (48K) ONLY \$666.00 (Ex. Tax)

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SOFTWARE FROM ONLY \$19.95

Make no mistake. When you turn this page, you'll be returning to a world very different from this one. A world in which all microcomputers will suddenly seem very ordinary.

For more information and the location of your nearest dealer, contact —

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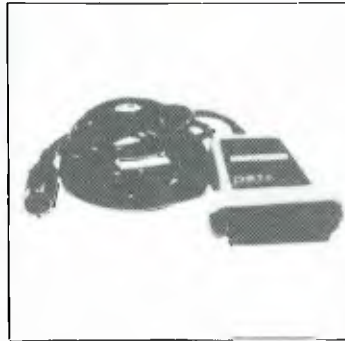
VIDEO PAK 80:

Features:

- High resolution 80 column display.
- Includes word processing software.
- Includes spreadsheet software.
- Includes terminal emulator software.
- 80 column mode allows full use of BASIC.



PARALLEL PRINTER INTERFACE:



Features:

- Connects standard parallel printers to Commodore computers
- Translates the Commodore character set to ASCII
- Passes through graphics characters
- Does not require power hookup from the printer, computer or any external source
- Attractive packaging — it looks like a cable, no ugly boxes
- Easy to use — simply plug it in, no software to load or switches to configure

The Video Pak 80 from Data 20, is an integrated system that features a word processor, spreadsheet and 80 column screen adaptor cartridge for the Commodore 64.

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The SLR is available for the COMMODORE 64.

Included with your SLR are 3 exciting action games with full sound effects: HIGH NOON, SHOOTING GALLERY and GROUSE SHOOT!! More approved games titles are available from Stack and other software houses. RATS & CATS

ESCAPE FROM ALCATRAZ, BIG GAME SAFARI, CROW SHOOT

For those games that require agility and fast reactions, the SLR can break down from a rifle into a pistol. The SLR connects to your computer by 12 feet of cable. All this including 3 cassette-based games



Stack CBM 64 IEEE-488 Cartridge

(Also available for VIC-20)

An economic and efficient device which plugs into the cartridge slot of the computer and provides a standard CBM IEEE-488 connector. This enables many of the common IEEE-488 devices such as Commodore 3000, 4000 and 8000 series disk drives and printers, and most Hewlett Packard units to be used with the CBM 64.

Stack CBM 64 RS232C Interface

(Also available for VIC-20)

The interface is a small cartridge-like device which plugs into the user-part of the CBM 64 and provides a socket which enables the computer to communicate with most RS232 devices such as printers, teletypes, modems, vdu's etc.

Stack CBM Compiler for 1541 Disk

A fully CBM 64 Compatible Compiler which produces programs which operate many times faster than the normal Basic Interpreter on the CBM 64.

This program enables a program written in BASIC to run at speeds approaching those achieved by the best machine code authors.

Stack CBM 64 Arrow Plus Cartridge

Arrow Plus is a cartridge for the CBM 64 computer providing the user with the following features:-

- High Speed Cassette Operation at up to 7 times normal speed.
- Machine Language Monitor.
- Hexadecimal Calculator.
- Assembler.
- Disassembler.

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(Also for VIC-20)

The motherboard is simply a 4-goes-into-1 adaptor for the CBM 64 cartridge slot. It has several important design features for maximum user appeal and flexibility:-

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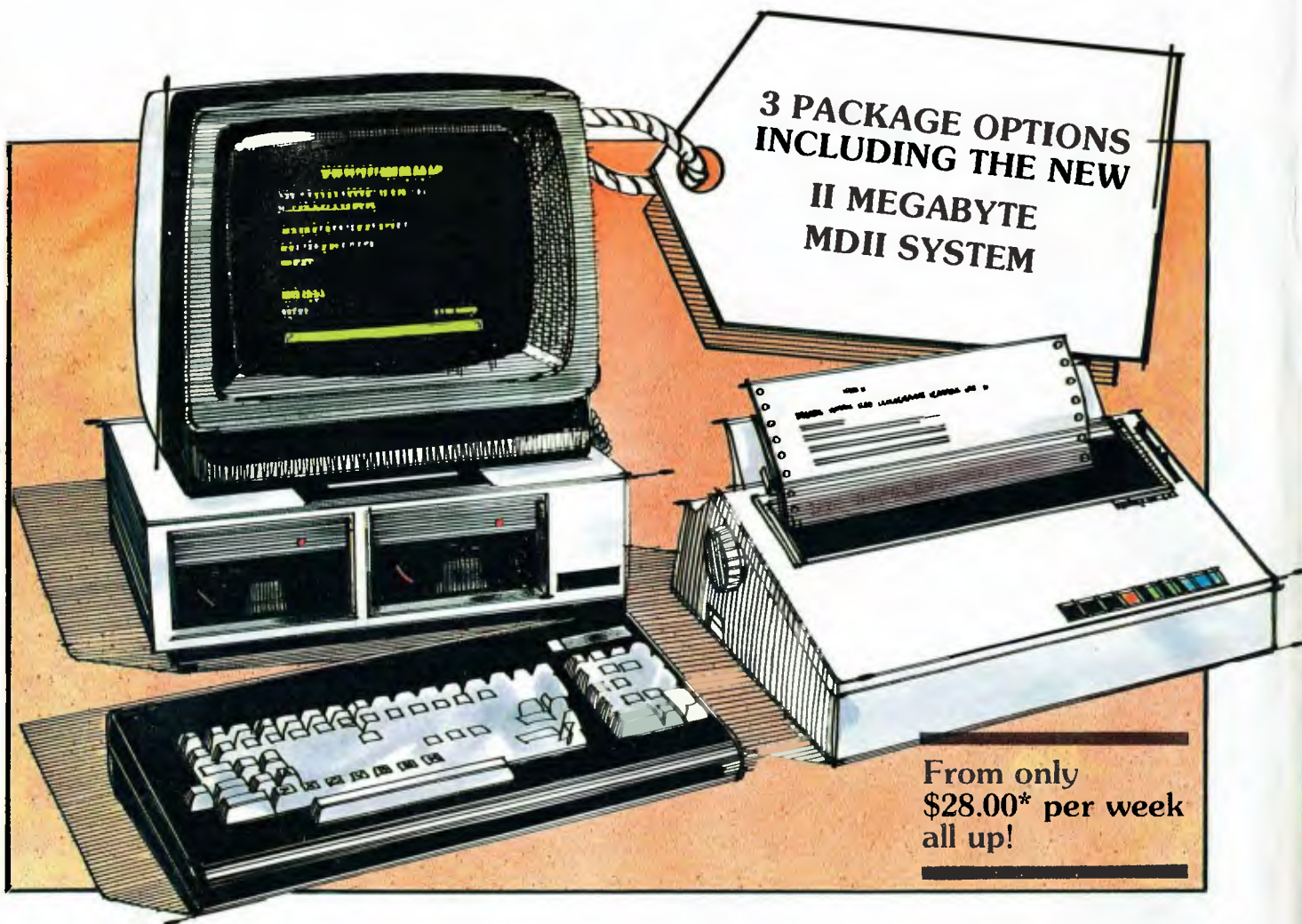
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From \$28.00* per week its the most affordable word processing solution around!

Offer includes: • Dedicated word processing computer • 10 software applications and programs • Industry standard CP/M operating system • High quality, full feature visual display terminal • Letter quality printer • Installation and systems familiarisation • Easy to follow instruction driven user interface

THE WORD TRAVELS FAST!

Archives have placed hundreds of systems into Government, Commerce and Industry over the past nine months. It must be the best value for money pack on offer today. Its' reliability and ease of use make it a tremendous buy for the most inexperienced computer user. There is no need to learn the technicalities as the system is explained in step by step instructions plus applications have "on screen" help!

Check this for value: * Famous WORDSTAR word processor with a spelling checker corrector * Easy-to-use Database system for information storage and retrieval

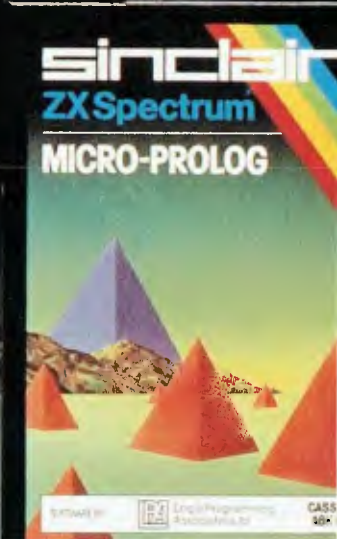
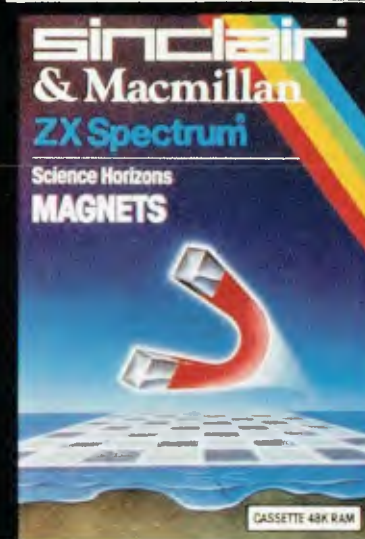
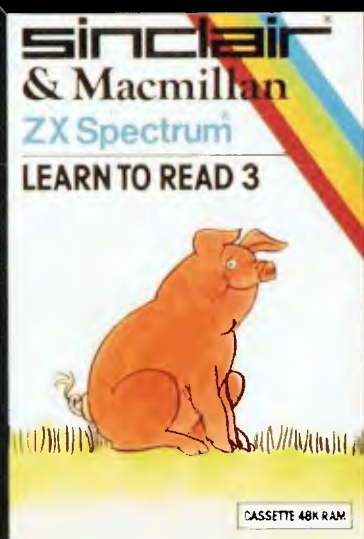
* Powerful financial modelling package * A bookkeeping suite with extensive reports (MD3 only) * A cheque book maintenance application * 3 programming languages including industry standard MBASIC * Communication software for talking to other systems * Letter quality printer with an optional cut sheet feeder * Terminal keyboard dedicated to word processing * Installation and familiarisation with the system (Metropolitan and certain country areas only).

Contact your local dealer for the details of this offer or book now for a seminar at Archives offices.

***Lease price to approved purchasers.**

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The only home computer
that comes with its own
school library.



The Sinclair Spectrum is just \$249 for the 16K model, \$359 for 48K. Microdrives (mass information storage units) \$149. Interface 1 (an expansion interface 2 lets you use the ROM cartridge, a revolutionary new software form) \$79. Printers \$169. The Spectrum takes any standard joystick.

If your kids get to learn about computers now, it can be a definite advantage when they leave school.

However, few computers provide any real help with a more immediate problem: getting your kids through school.

The sad fact of the matter is unless you spend thousands of dollars, you end up with little more than a tricked up computer games machine.

And your kids end up skipping their homework again.

One exception is the Sinclair Spectrum. It's the only home computer with a whole library of educational software.

So instead of competing with your kid's homework, it actually complements it.

The Sinclair Spectrum also happens to be the perfect computer to teach your kids about computers.



on device which allows Spectrum to drive microdrives, communicate with other computers, send data by telephone, network, etc.) \$149.
k. All prices recommended retail.

Because it starts out as a simple and inexpensive keyboard.

And grows, piece by piece, into the sophisticated computer system you see here.

So don't buy your kids a computer that ignores their education.

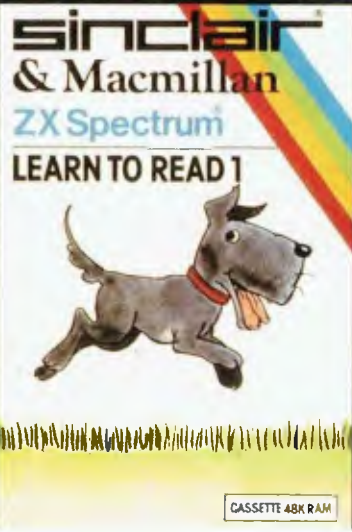
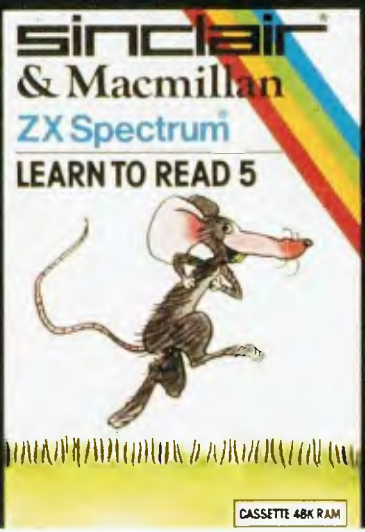
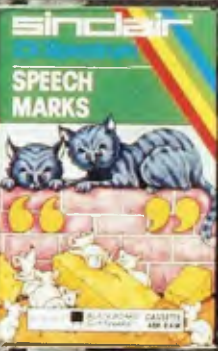
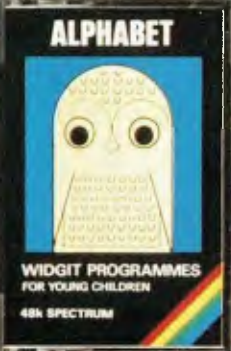
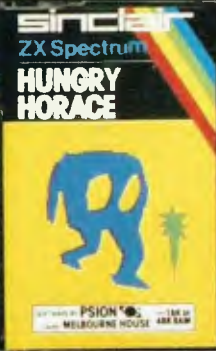
Give them the one that teaches them about computers while it helps them through school.

The Sinclair Spectrum.

The Sinclair Spectrum.

The Sinclair Spectrum and the vast array of educational software that goes with it are brought to Australia by Barson Computers Pty Ltd, Australia's leading independent computer company.

BARSON COMPUTERS



The Sinclair Spectrum is available from these authorised dealers:
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 Ballarat North: Computer Biz.
 Bendigo: Cartridge Disk & Tape.
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 Colac: Hallaron Motors P/L.
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